Powerstocc® Excellent

Installation and Operation

PS 3.0 Excellent

LEGAL NOTICE

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CENTROSOLAR AGis aware of the importance of language with regard to the equality of women and men and always makes an effort to reflect this in the documentation. Nevertheless, for the sake of readability we are unable to use non-gender-specific terms throughout and have used the masculine form as a rule.

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Software version above FW: 5.00

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Thank you for choosing a solar inverter Powerstocc Excellent from Centrosolar AG!

We hope you enjoy consistently high energy yields with the Powerstocc Excellent inverter and your photovoltaic system.

If you have any technical questions, please call our customer support: +49 (0)831 540 214 66

1 Notes on this manual

Read this manual carefully in its entirety. It contains important information on the installation and operation of the inverter. Pay particular attention to the instructions regarding safe usage. CENTROSOLAR AG assumes no liability for damages arising from the non-observance of this manual.

This manual is an integral part of the product. It only applies to solar inverters Powerstocc Excellent from Centrosolar AG. Keep this manual and give it to the new owner should you pass it onto a new operator.

The installer as well as the user must always have access to this manual and must be familiar with its contents, particularly the safety instructions.

Target groups

This manual, especially chapters 8 (‹Installation›) and 9 (‹Commissioning and de-commissioning›), are intended for **specialist tradespersons**. Information relevant for the **operator** can be found in chapters 10 (‹Inverter operating characteristics›) and 11 (‹System monitoring›).

Information concerning your safety or that of the unit is highlighted especially.

2 Proper use

The Powerstocc Excellent inverter converts direct current into single-phase alternating current and supplies it to the public power grid. The device may only be used in grid-connected photovoltaic systems within the permissible power range and under the permissible environmental conditions. The device may only be operated in PV systems in which no electrical pole is earthed. The device is not intended for mobile use.

Inappropriate use can be hazardous and lead to injury or even death of the user or third parties. Material damage to the device and other equipment can also occur. The inverter may therefore only be used for its intended purpose.

Exclusion of liability

Any use that differs from or goes beyond the stated intended purpose is considered inappropriate.
The manufacturer accepts no liability for any damage resulting from this. Modifications to the inverter are prohibited. The inverter may only be used if safe to operate and in technically perfect condition. Any instance of misuse will cause the termination of the warranty, guarantee and general liability of the manufacturer.

Only a qualified electrician may open the device.
The inverter must be installed by an electrician who is responsible for observing the applicable norms and regulations. Work that could affect the electrical power system of the respective utility company at the site of the solar energy feed-in may only be carried out by qualified electricians expressly authorised (licensed) by the utility company.

This includes changes to the factory preset parameters. The installer must always observe the regulations of the utility company. The utility company's specifications must always be observed when setting the parameters, since otherwise the ENS (grid monitoring) will no longer function correctly.

3 EU Declaration of Conformity

EU Declaration of Conformity

The company

Centrosolar AG
Stresemannstrasse 163
22769 Hamburg

hereby declares that the inverters

Powerstocc Excellent 3.0

to which this declaration refers, conform to the following guidelines and standards.

EMC Directive 2004/108/EEC

EN 61000-3-2:2006/A1:2009/A2:2009 (Harmonic currents)

EN 61000-3-3:2008 (Flicker)

EN 61000-6-2:2005/AC:2005 (Interference resistance for industrial environments)

EN 61000-6-3:2007/A1:2011 (Interference emission for domestic environments)

2006/95/EEC Low Voltage Directive

EN 62109-1: 2010 (Safety of converters for use in photovoltaic energy systems) - Part 1: General requirements

EN 62109-2: 2011 (Safety of converters for use in photovoltaic energy systems) - Part 2: Special requirements for inverters

This declaration applies to all identical copies of this product. This declaration loses its validity if the device is modified or incorrectly connected.

CENTROSOLAR AG – 2012-12-18

Dr. Josef Wrobel
(Member of the Management Board)

Dipl.-Ing. Mirko Held
(Head of Product Management)

This declaration certifies the compliance with the mentioned regulations but does not ensure the properties. The safety instructions in the product documentation provided must be observed!

4 Safety instructions

Safety instructions have been incorporated into the instruction text.

These safety instructions tell you about possible risks.

Each safety instruction consists of the following elements:

Element	Example
Warning symbol	
Signal word	Danger
Type of danger	Risk of death due to electrical shock!
Corrective actions	Always disconnect the device from the power supply during installation and before maintenance and repairs and lock it to prevent it being switched back on.

Table 1: *Structure of the safety instructions*

4.1 Warning symbols

Warning symbols identify the type of danger.

The following warning symbols are used:

	Danger due to electrical shock
	Danger due to electromagnetic fields
	Danger due to burns
	Danger due to electrical discharge! With an indication of the discharge duration of the capacitors following disconnection of the inverter
	Other dangers

Table 2: *Warning symbols*

4.2 Signal words

Signal words are used to identify the severity of the danger.

These signal words are used in this manual:

Danger: Serious injuries that may cause death may occur.

Warning: Minor injuries or severe damage to property may occur.

Attention: Minor damage to property may occur.

4.3 Safety markings

The labels and markings attached to the housing by the manufacturer may not be changed or removed.

4.4 Types of danger

Before working on an inverter, the device must always be de-energised.

The inverter is only de-energised after the following work steps have been carried out.

⚠ IMPORTANT INFORMATION

These work steps must be performed before carrying out any work on the inverter!

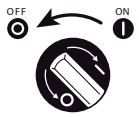
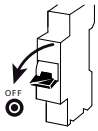
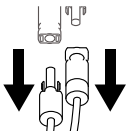
1.		Switch off DC switch
2.		Switch off line circuit breaker For internal consumption: Switch off line circuit breaker for the control of internal consumption.
3.		Secure it against reactivation.
4.		Disconnect DC lines
5.		Wait five minutes (discharge time of the capacitors)

Table 3: *De-energise the inverter*

The following dangers exist when working on the inverter:

	Danger due to electrical shock! Always disconnect the device from the power supply during installation and before maintenance and repairs (see Table 3).
	Danger due to electromagnetic fields! Persons with pacemakers, metallic implants or hearing aids should avoid proximity to systems with inverters.
	Risk of burns from hot parts! Some of the inverter components can reach temperatures of over 80 °C during operation. Do not touch hot components.
	Risk of fire due to hot parts! Be absolutely sure to observe the conditions in the "Installation" chapter (page 13) when choosing the installation location.
	Burns from arcs! Cables must never be removed from the device during operation as this can cause dangerous arcs. First de-energise the DC side, then remove plug-in connectors!
	Danger due to electrical discharge! Wait five minutes after de-energising the inverter!
	Warning! Property damage! Property damage to the device, lost earnings or increased telephone fees can result. The instructions refer precisely to the type of and remedy for potential property damage.

Table 4: *Warning symbols*

5 Scope of delivery

The packaging contains:

— 1 inverter (*1*)
— 1 wall mount (not for replacement devices) (*2*)
— 1 operating manual (3)
— 1 safety notes (4)
— 1 CD (*5*)
— 1 sealing cap for sealing the AC terminal (mandatory in Italy) (*6*)
— Installation accessories: 4 Screws DIN 571 A2 6×45, 4 screw anchors with a diameter of 8 mm and length of 40 mm, 1 tapping screw DIN 7516 form A galvanised (M4×10) (*7*)
— Plug seals for the screw connection for the network cable (*8*)
— 2 counterparts for plug-in connectors (*9*) (1 × plug, 1 × socket)

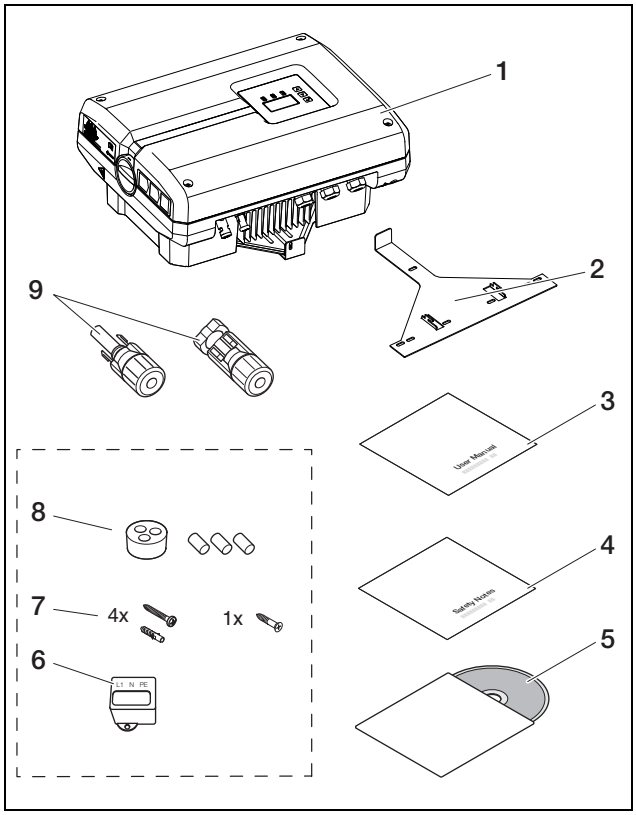


Fig. 2: *Scope of delivery*

6 Transport and storage

The function of the inverter has been tested and it has been carefully packed prior to delivery. Upon receipt, check the delivery for completeness and any transport damage. Complaints and damage claims are to be directly addressed to the shipping company.

ATTENTION

Risk of damage when the inverter is placed on its underside.

- Always place the inverter on its rear side (cooling elements) after unpacking.

If stored for a longer period before installation, all components of the inverter must be kept dry and dust-free in the original packaging.

7 Unit and system description

Function

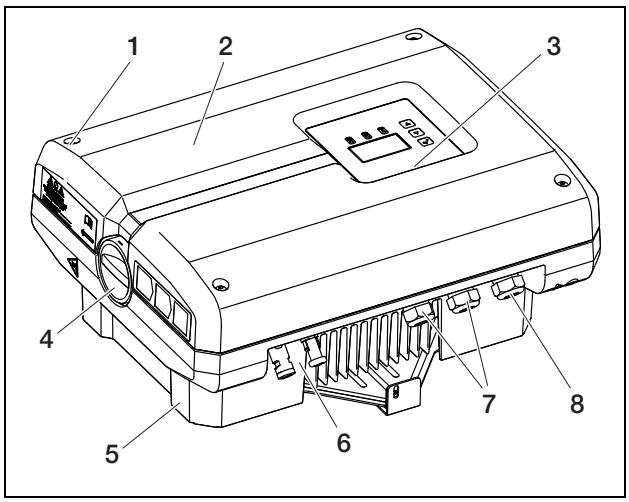


Fig. 3: *Inverters Powerstocc Excellent*

1 *Screws*
2 *Cover*
3 *Display*
4 *DC switch*
5 *Housing*
6 *Plug-in connector or cable openings to connect the solar modules*
7 *Cable openings for optional communication*
8 *Opening for the mains cable*

The Powerstocc Excellent solar inverter is a powerful and transformer-less string inverter. It converts direct current generated by the photovoltaic modules into symmetrical, single-phase alternating current and supplies it to the public power grid. Power generation independent of the public grid (island operation) is not possible.

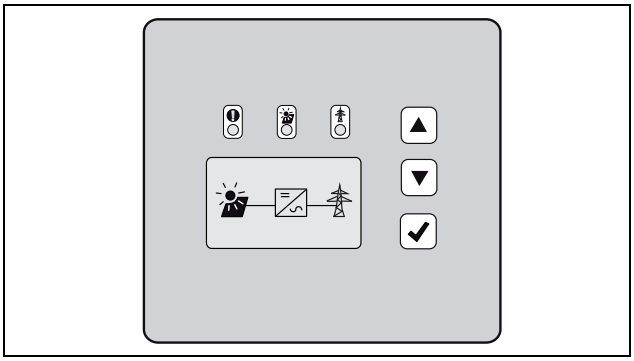


Fig. 4: *Control panel Powerstocc Excellent*

For purposes of grid monitoring, the Powerstocc Excellent inverter uses the modern and interference-free phase-shifting process.

The Powerstocc Excellent inverters have an integrated DC load break switch. No external break switch is required. The solar modules are connected to the inverter via plug-in connectors.

In order to conveniently display the yields and production data of your photovoltaic system, the inverter has an integrated web server, see chapter 8.6.1.

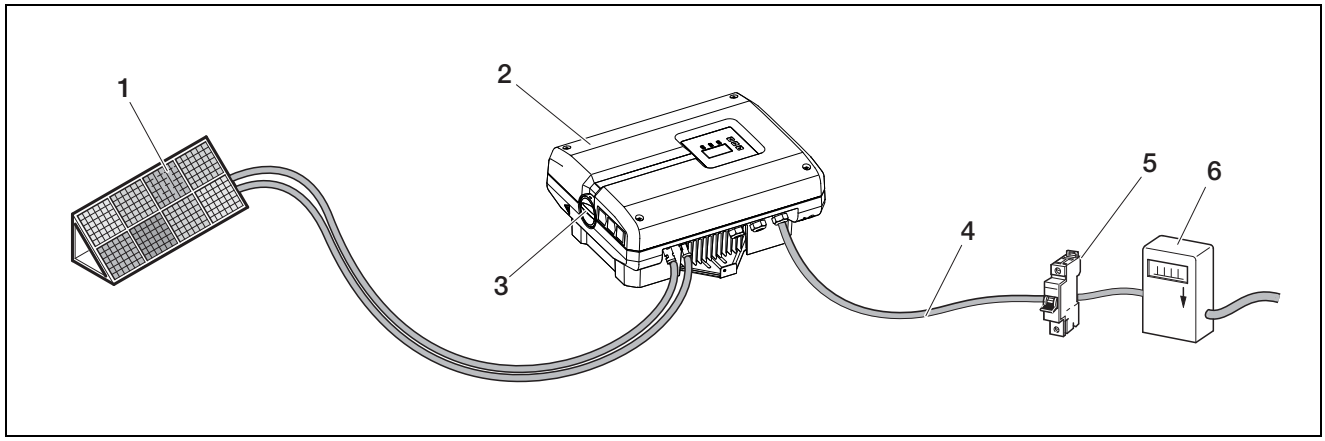


Fig. 5: System illustration of a grid-connected photovoltaic system

1 *PV string 1*
2 *Inverters*
3 *Electronic DC switch*
4 *AC mains cable*
5 *Single-phase AC line circuit breaker*
6 *Feed meter*

Inputs

The Powerstocc Excellent operates using the so-called string principle: In this system, a limited number of solar modules (depending on the desired power output while considering the maximum permissible input voltage) are connected in series as a string, which is then connected to the inverter. The number of strings depends upon the configuration of the solar system.

Always note the specifications on the type plate!

Internal consumption

The Powerstocc Excellent inverters are designed in such a way that the generated power can be used internally either entirely or in part.

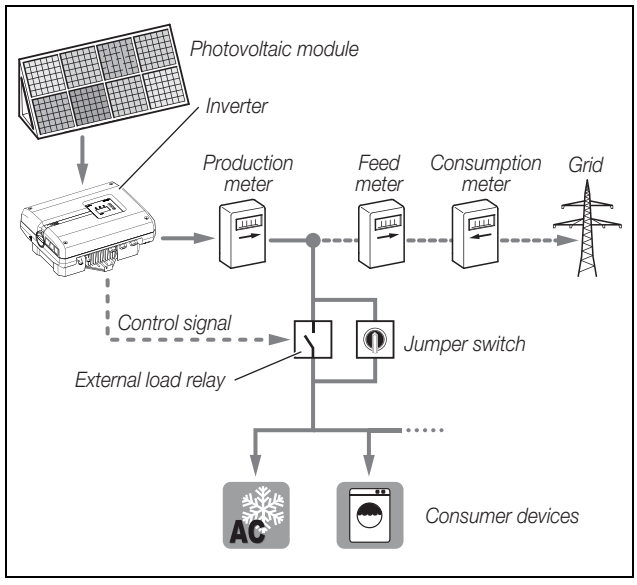


Fig. 6: Possible configuration for internal consumption

The switch output is a potential-free NO switch and can deal with a max. load of 100 mA.

Note: An external load relay must be installed between inverters and devices. No devices may be connected directly to the inverter!

You can find the description for the electrical connection in section “Connect switch output (S0/Al OUT)” on page 26.

You can find the description of the S0 output configuration for the control of internal consumption in section “Setting the switch output function” on page 31.

Active power and reactive power control

The terms

There are three types of electrical power in the mains grid:

— Active power (W)
— Reactive power (Var)
— Apparent power (VA)

Active power

Active power is that electrical power that is converted by an ohmic device. Ohmic devices are devices with no coil and capacitors (e. g. heat radiators, electric stoves, light bulbs). The active power is registered by the usual electricity meters. This means that only the active power is calculated or paid for.

The active power current is "in phase". This means that current and voltage are synchronous. Both reach the zero point and the peak value at the same time.

Reactive power

Reactive power is that electrical power that is converted by inductive and capacitive devices. Inductive devices are coils. Capacitive devices are capacitors.

These devices require electrical energy in order to build up the magnetic or electrical field. This power is referred to as reactive power. Devices with motors and capacitors (e.g. washing machine) draw reactive power from the grid.

The reactive power is not registered by the usual electricity meters. However, like the active power, it does draw from the power grid. The reactive power current is "out-of-phase". That means that power and voltage reach the zero point and the peak value at different times.

Apparent power

Apparent power is the total power, consisting of real and reactive power. The calculation of electrical power takes place through the geometrical addition with the angular functions (cosφ, sin φ and tan φ).

Displacement factor cosφ

The size of the real, reactive and apparent power can be determined with the displacement factor cos φ. The smaller the cos φ factor is, the less the active power and therefore the greater the reactive power.

Note: The displacement factor cos φ can be set with the parameterisation software Parastocc in order to define the magnitude of the reactive power.
You can acquire the software from support.

VDE application rule (VDE-AR-N 4105) and Renewable Energies Act (EEG) 2012

New application rules for PV systems have applied in Germany since 1 January 2012. The VDE application rules (VDE-AR-N 4105) and the Renewable Energies Act (EEG) are compulsory. The Powerstocc Excellent inverters satisfy the currently required standards and guidelines.

Note: Should the PV system not fulfil the Renewable Energies Act (EEG) 2012, the grid operator can reduce the feed-in tariff or dispense with it entirely.

The following points are relevant when implementing the new application rules:

— Frequency-dependent active power control
— Active power control with a ripple control signal receiver
— Fixed limitation of the feed-in power to 70% of the PV output
— Provision of reactive power
— Regulating of unbalanced loads

Frequency-dependent active power control

To date inverters are to be immediately disconnected from the grid when they exceed the upper frequency limit of 50.2 Hz. Grid stability can be negatively impacted by the abrupt switching off of large generation systems. Hence the need for an active power reduction solution in the event of overfrequency.

This means that inverters need not be disconnected from the grid when exceeding 50.2 Hz, but instead that the active power must be reduced. This active power is then reduced by 40% per Hz. When the frequency reaches 51.5 Hz, the inverter must be immediately separated from the grid.

Active power control with a ripple control signal receiver

The active power of the Powerstocc Excellent inverter can be controlled directly by the energy supply company via a ripple control signal receiver (*1*). With this technology, the generated power can be regulated at four levels (see Fig.7).

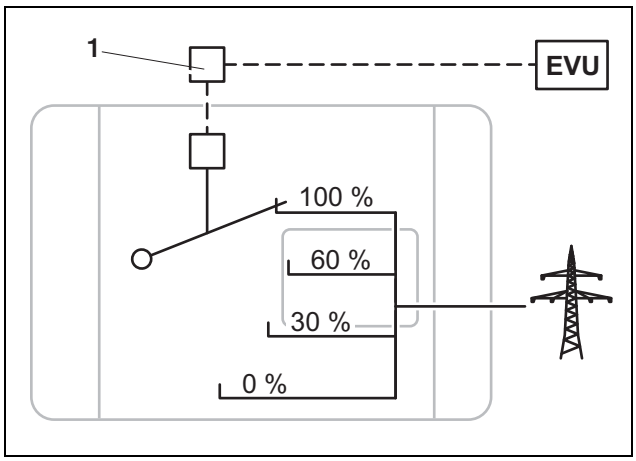


Fig. 7: *Active power control with a ripple control signal receiver*

Note: For all Powerstocc Excellent inverters, the ripple control signal receiver can be directly connected without an additional device (see section “Connecting a ripple control receiver for active power control” on page 27). The regulating function is activated in the web server of the inverter (option "Function of analogue inputs: active power control").

Fixed limitation of the feed-in power to 70% of the PV output

Should the active power control not be realisable with a ripple control signal receiver, the feed-in power is then generally to be reduced to 70% of the PV generator output according to the Renewable Energies Act 2012 (EEG 2012).

The reduction is carried out with the parameterisation software Parastocc.

Provision of reactive power

As of a system apparent power of 3.68 kVA, the energy provider must release a part of the generated power as reactive power.

With the parameterisation software Parastocc, the reactive power can be specified as follows:

cos φ	A value for cos φ is prescribed
cos φ (P)	An active power curve is prescribed

Table 5: *Reactive power control with* Parastocc

In addition, the displacement factor cos φ can be remote-controlled through a ripple control signal receiver. Configuration to this purpose is also to be carried out with PARASTOCC.

Regulating of unbalanced loads:

In order that the power grid remains stable, it must be evenly loaded. Single-phase feed-in results in an uneven load (unbalanced load) in the grid.

The maximum permitted unbalanced load measured between the phases is 4.6 kVA.

Note: When several Powerstocc Excellent 3.0 inverters are used, the inverters must be operated at different phases.

You can get further information on this from our customer support (+49 (0)831 540 214 66).

8 Installation

⚠ **DANGER**

Risk of death due to electrical shock!

When performing any work on the inverter and feed cables:

- De-energise the AC and DC sides of the device, see chapter 9.4 ‹Switching the inverter off/decommissioning›.
- Secure the voltage supply from being unintentionally switched back on.
- Wait at least five minutes until the capacitors of the inverter have discharged.
- Check the device and cables to make certain that they are voltage-free.
- Prior to installation, check whether the local mains grid and the power output of the photovoltaic modules are compatible with the technical data of the inverter. Observe the type plate.
- Observe the specified sequence of installation tasks: Install the inverter first, then connect it to the electricity supply.
- Observe all national regulations in the country of use as well as the connection and safety regulations of the local energy supplier.
- Pay attention to careful and correct installation: No dirt, no foreign bodies and no moisture may enter the inverter.

8.1 Installation

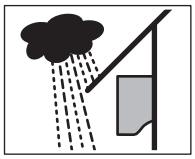
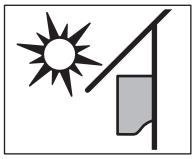
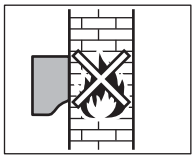
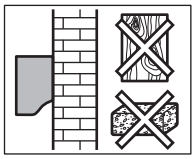
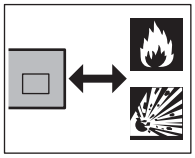
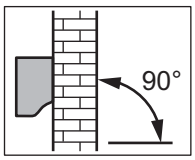
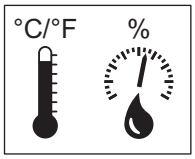
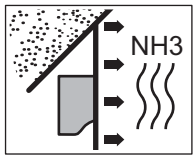
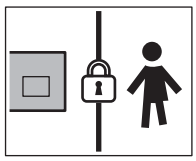
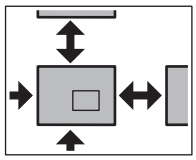
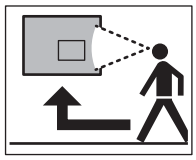
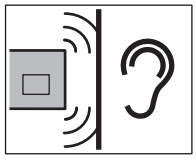
⚠ DANGER

Risk of death due to improperly performed installation!

Improper installation can lead to life-threatening situations. The inverter and the components connected to it can also be damaged, increasing the risk of fire.

Selecting the installation site

Note: Observe the following instructions when selecting the installation location. Guarantee claims may be restricted or become entirely null and void in the event of failure to observe.

	Protect inverter from rain and splash water.
	Protect inverter against exposure to direct sunlight.
	Mount inverter on a non-flammable installation surface.
	Mount inverter on a stable installation surface that can securely bear the weight of the inverter. Plasterboard walls and wood planking are not permitted.
	A sufficient safety distance from flammable materials and explosion hazard areas in the vicinity are to be ensured.
	Mount inverters on vertical installation surfaces.
	The ambient temperature must lie between -20 °C and +60 °C. The air humidity must lie between 0 % and 95 % (non-condensing).
	Protect inverter against dust, contamination and ammonia gases. Rooms and areas containing livestock are not permitted as installation locations.
	Install inverters so that they are not accessible to children.
	Maintain a minimum distance to other inverters and other objects (see Fig. 8, page 14). Minimum distance, horizontal: 100 mm Minimum distance, vertical: 200 mm An unimpeded air supply must be assured!
	Inverter must be easily accessible and the display clearly visible.
	Inverter can cause noise when in operation. Install inverter in such a way that people are not disturbed by operation noises.

Installing the wall mount and hanging the inverter

- Mark the positions of the drill holes at the installation site by using the wall mount as a drilling template.

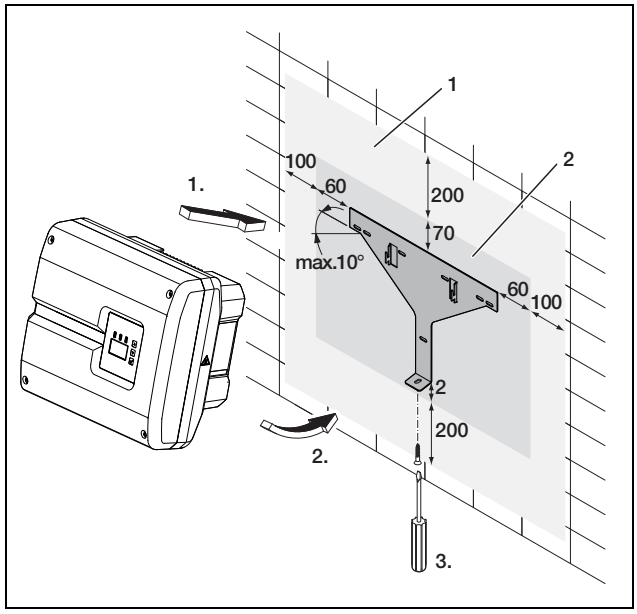


Fig. 8: Install inverter

1 Required space for cooling
2 Outer dimensions of the inverter

- Drill holes and insert wall anchors if necessary.
- Screw the wall mount to the intended surface. Use the supplied screws.
- Hang the inverter on the wall mount.
- Fasten the inverter on the underside using the supplied screw.

8.2 Electrical connection

⚠ DANGER

Risk of death due to electrical shock!

If exposed, voltage-carrying cables make contact, an electrical arc can occur, posing a life-threatening hazard.

- Only remove as much of the cable insulation as is necessary. The insulation must reach up to the terminal.

⚠ DANGER

Risk of death due to electrical shock!

Metal slivers can fall into the inverter when removing the insulation. Contact with voltage-carrying components during operation can cause an electrical arc to occur, posing a life-threatening hazard.

- Never remove the cable insulation above the inverter!

Opening the housing

- Release the four screws of the cover and carefully remove the cover.

8.3 Connecting the AC side

- Unscrew the cable screw connection for the mains cable (*1* in figure 9).

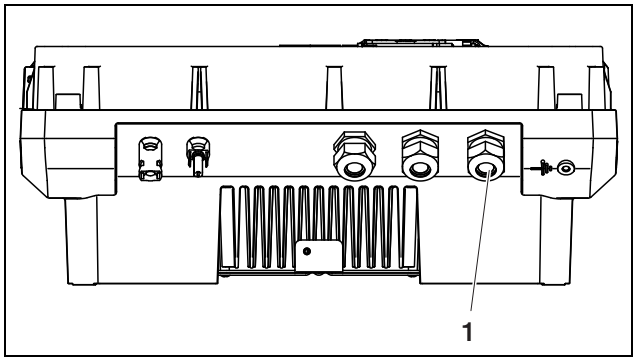


***Fig. 9:** Connections on the housing*

1 Cable screw connection for mains cable

- Press the blind plug and the sealing ring out of the screw connection **from the inside outwards** using a screwdriver or similar implement. Detach the sealing ring from the blind plug.

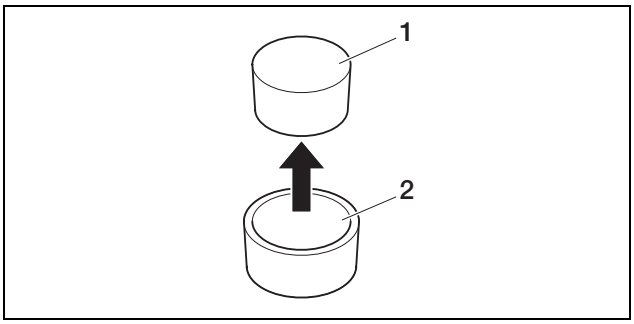


***Fig. 10:** Pressing the blind plug out of the sealing ring*

1 Blind plug
2 Sealing ring

We recommend a mains cable with the cross-section 3×2.5 mm². The outer diameter of the cable can be 9...17 mm, the cross-section of the individual conductors can be a max. of 4 mm² for flexible cables and a max. of 6 mm² for rigid cables. For flexible cables, we recommend using core end sleeves.

- Remove the sheath and the insulation of the mains cable as much as needed.
- First thread the unscrewed union nut (*4* in illustration 11) and then the sealing ring (*3* in illustration 11) over the cable.
- Guide the mains cable through the cable duct into the interior of the inverter.
- Thread the sealing cap (illustration 12) over the mains cable. The sealing cap is mandatory in Italy.

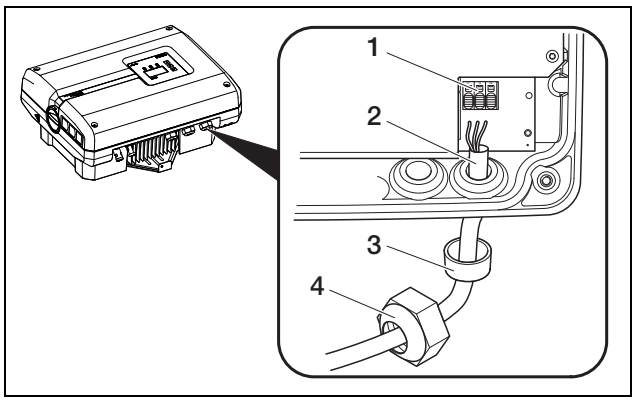


Fig. 11: *Laying the mains cable*

1 AC terminal
2 Mains cable
3 Sealing ring
4 Union nut

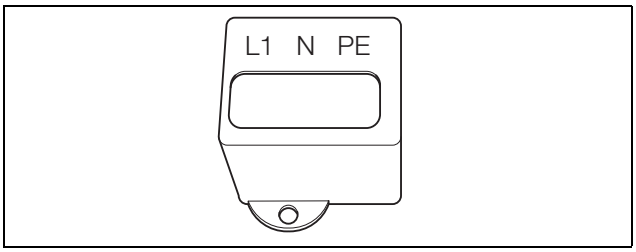


Fig. 12: *Sealing cap for AC terminal*

Note: To connect the AC and DC cables, the inverter is equipped with spring-loaded terminal strips (figure 13).

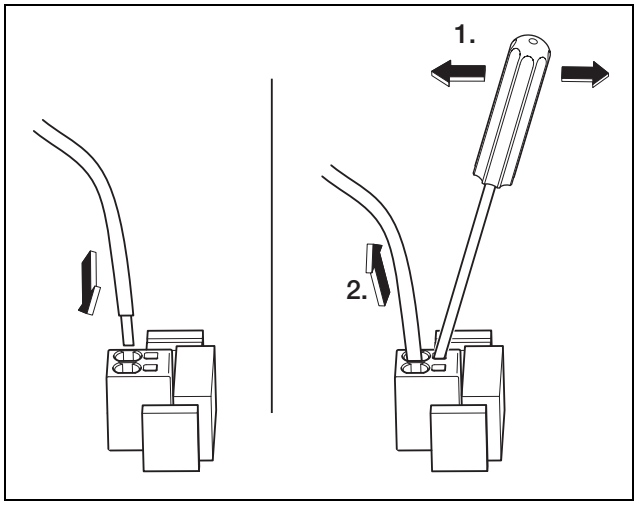


Fig. 13: *Spring-loaded terminal strip: Fastening the cable (left), detaching the cable (right)*

- Connect the conductors of the mains cable to the AC terminal in accordance with the labelling (figure 14).

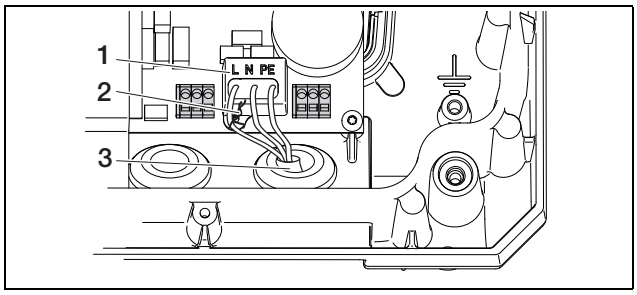


Fig. 14: *Mains cable connected (with sealing cap*

1 Sealing cap
2 Sealing wire
3 Mains cable

- Place the sealing cap on the terminal block and attach the seal. The sealing cap is mandatory in Italy.
- Screw the union nut with inner sealing ring and plug tightly onto the cable screw connection.

Note: The threaded cable connection seals the housing against moisture and functions as strain relief.

- Check whether all lines are securely connected and cannot loosen on their own.

- Switch off the current distributor and secure the voltage supply from being unintentionally switched back on. Ensure that the current distributor is de-energised.
- Lay the mains cable from the inverter to the current distributor.
- **WARNING! Risk of fire due to overcurrent and heating of the mains cable.** Note the cable cross-sections and the information about the line circuit breaker. Install a line circuit breaker 16 A into the mains cable between the inverter and the feed meter to secure it against overcurrent.
- Do **not** switch on the voltage yet.

8.4 Earth connection (only for France)

For connection in France, the inverter must be earthed as shown in the following illustration.

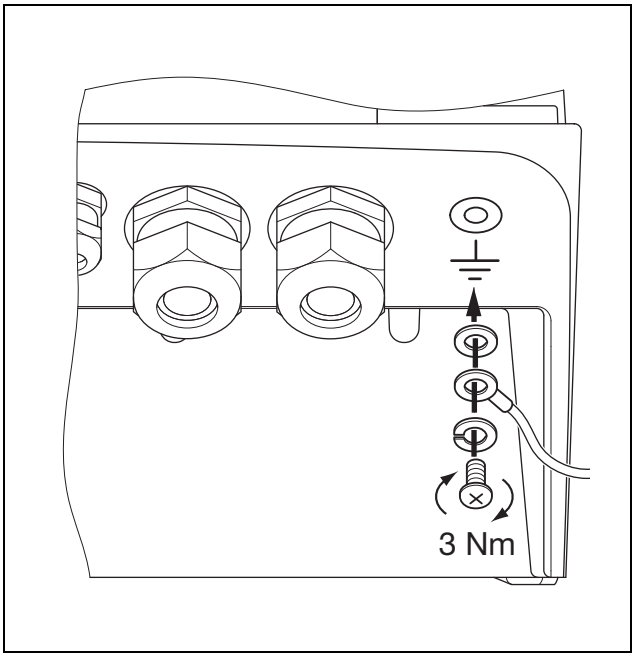


Fig. 15: *Earth connection (only for France)*

8.5 Connecting the DC side

The number of strings to be connected depends on the configuration of the photovoltaic system.

We recommend using tin-plated cables. If non-tin-plated cables are used, the copper strands may oxidise as a result of which the transition resistance of the crimp connections will be too high.

The delivery package of the inverter includes plug-in connectors from Multi-Contact (type MC4).

During assembly, always observe the **latest specifications from the manufacturer of the plug-in connectors**, e.g. regarding required special tools, permissible tightening torques etc.

Further information is available, for example, online at www.multi-contact.com.

Installing the plugs onto the DC cables

⚠ DANGER

Risk of death due to electrical shock!

The PV lines may be live when the PV field is irradiated.

- Ensure that the DC switch is set to O (OFF). The plug-in connectors may be plugged in and disconnected in this position only.
- Eliminate any existing earth faults or short circuits in the strings.
- Remove 6–7.5 mm of insulation from the DC cables. Be careful not to cut any individual conductors.
- Crimp the DC cables according to the recommendations of the plug-in connectors' manufacturer.
- Lead the crimped contacts from behind into the plug or socket insulation until they engage. Make sure to use the correct counterparts for the plug-in connector couplings on the inverter. Observe the polarity of the cables.
- Pull gently on the cable in order to check whether the metal part has engaged.
- Check that assembly has been carried out in accordance with the recommendations of the plug-in connectors' manufacturer.
- Hand-tighten the cable connections. The tightening torque must match the DC cable. Typical values are between 2.5 Nm and 3 Nm.

Inserting DC cables into the inverter

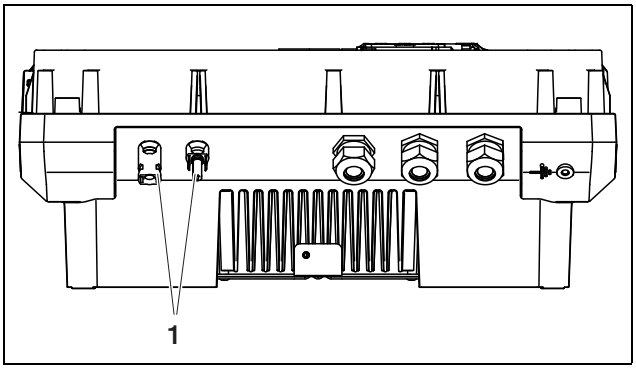


Fig. 16: DC inputs (the number of inputs which can be used depends on the model)

1 Plug-in connector couplings DC input 1

- Check that the inverter is de-energised.
- Set the DC switch to OFF.

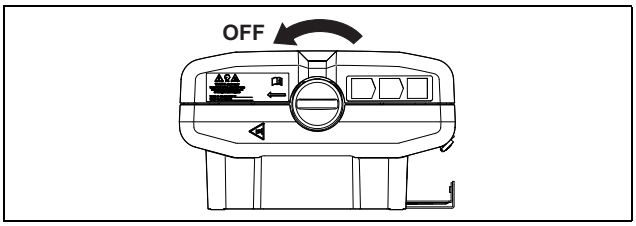


Fig. 17: DC switch OFF

- Remove the two plug seals from the plug-in connectors. Keep the plug seals.
- Insert the PV string plugs until they engage in the corresponding counterparts on the inverter (figure 18).

Note: Fuses for the individual strings are only necessary when more than two strings are connected parallel to an input. In this case, use a fuse in accordance with the specifications of the module manufacturer.

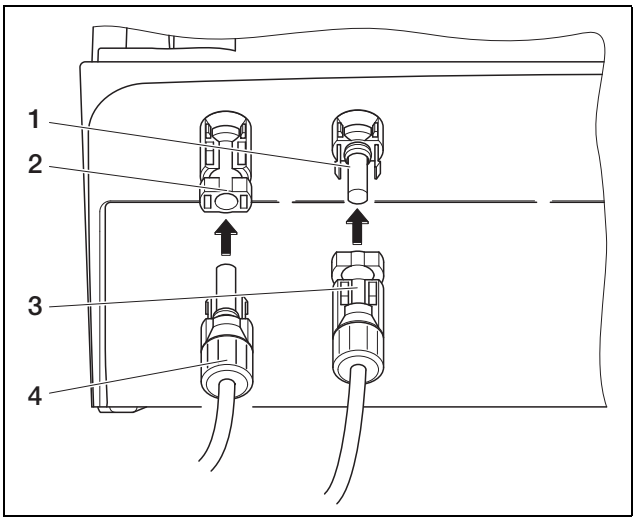


Fig. 18: Connecting the PV string

- Pull on the plugs in order to ensure that they are properly engaged.

Note: To disconnect the plug-in connectors, press the engaging clips together manually or with the tool available from the plug-in connectors' manufacturer and pull the plug out.

8.6 Connect communication components

Now install the available communication components, such as an analogue modem, cable etc. The GSM modem is an exception, since the PIN code of the SIM card must be entered **before** the GSM modem can be installed in the inverter with the SIM card (see section 9.2.1).

ATTENTION

Ensure that all cables run directly **over** the protective plate, do not protrude over the side of the protective plate and are fastened with cable ties.

⚠ DANGER

Risk of death due to electrical shock!

Single-insulated cables from communication components may come into contact with parts carrying grid voltage if the insulation is damaged.

- Only connect **double-insulated cables** to the inverter.

ATTENTION

The communication board may be damaged by electrostatic discharge.

- Touch a grounded point, for example the holder for the housing screw connection on the bottom right, before touching the circuit board.

8.6.1 Connecting to the web server of the inverter

- Connect the inverter with a computer as described in chapter 8.6.
- Set the Ethernet interface (TCP/IP protocol) of the computer so that the IP address automatically obtains the DNS server address. To alter this setting, administrator access rights may be required.
- Start your Internet browser and enter the letter S and the serial number of the inverter in the address bar, for example http://S12345FD323456
  ➜ The log-in window opens.
- Enter user name and password. The factory defaults for user name and password are set as follows:

User name: pvserver
Password: pvwr

- Confirm the entries by clicking on "OK".
  ➜ The main page of the inverter is displayed.

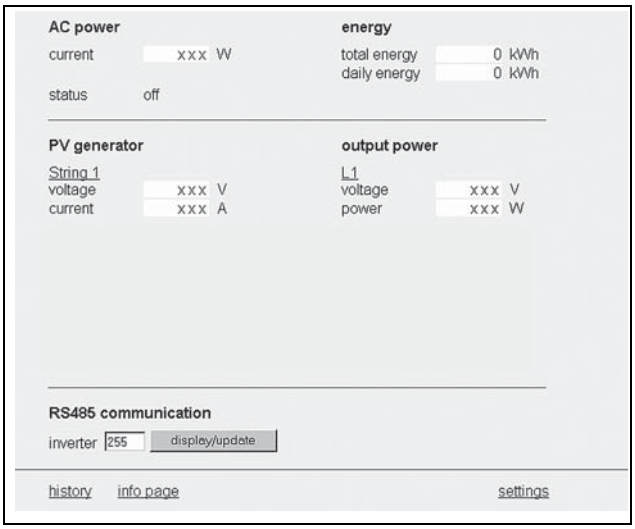


Fig. 19: *Main page of the web server*

Overview of the communications interfaces

In terms of communication options, four different situations are taken into account.

1. Inverter configuration.
2. Direct retrieval of the current yield/output values and/or saved log data.
3. Transfer of the yield/output data to an Internet solar portal.
4. Remote retrieval of the current yield/output values and/or saved log data.

Situation 1: Configuring the inverter

All settings relating to communication, for example, activation of data transfer to a solar portal, can be selected directly via the display or the integrated web server. In order to access the web server for configuration, you require a computer that is connected to the inverter either directly or via the network.

The inverter is equipped with two Ethernet interfaces (RJ45 sockets) for this purpose. The computer must also be equipped with this type of interface. The operating system is irrelevant, as the web server is called up via an Internet browser (e.g. Mozilla Firefox, Microsoft Internet Explorer).

You can then connect the inverter and computer either

a) directly via an Ethernet cable (see illustration 21) or

b) via a local network (switch/hub/router and Ethernet cable, see figure 22).

Version a) is the best option when no switch is available.
Version b) is the best option when a local network is already available. Several inverters can also be connected in the network (figure 20).

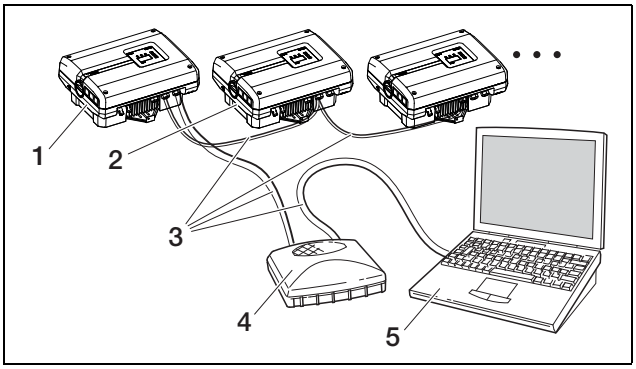


Fig. 20: *Multiple inverters in the network*

1 Inverters
2 Additional inverters
3 Ethernet/crossover cable
4 Switch/hub
5 Computer (for configuration or data retrieval)

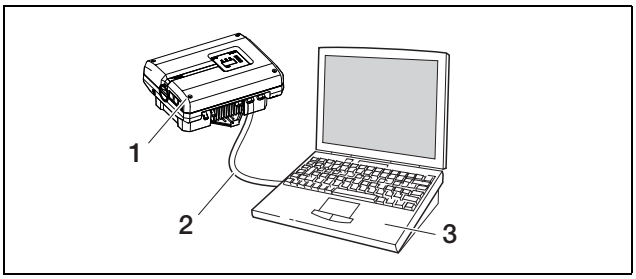


Fig. 21: *Connecting inverter and computer with Ethernet cable*

1 Inverters
2 Ethernet/crossover cable
3 Computer (for configuration or data retrieval)

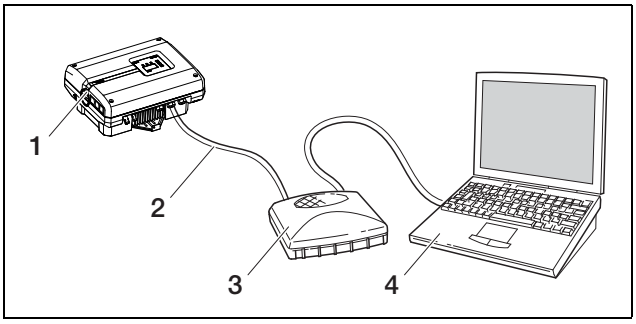


Fig. 22: *Connecting inverter and computer with Ethernet cables and switch*

1 Inverters
2 Ethernet/crossover cable
3 Switch/hub
4 Computer (for configuration or data retrieval)

Situation 2: Direct retrieval of the yield data

Querying of the saved log data of the inverter is also only possible using a computer. The units are cabled as described under situation 1.

Alternatively, you can connect the inverters to each other via the RS485 interface and then only need to connect one of the inverters via Ethernet (figure 23).

With this type of connection, the web server of the inverter connected via the Ethernet also displays the current output data of the other inverters. However, the web server and the stored log data are only available for the inverter connected via Ethernet.

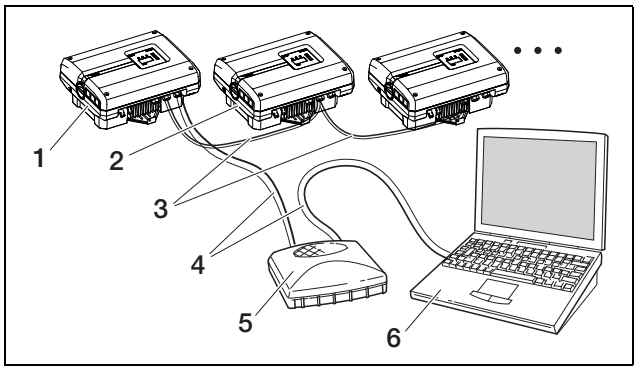


Fig. 23: *Connecting inverters via the RS485 and retrieving performance data via Ethernet*

1 Inverters
2 Additional inverters, max. 200 depending on cable length
3 RS485 connection
4 Ethernet/crossover cable
5 Switch/hub
6 Computer

Situation 3: Data transfer to a solar portal

The inverter can send yield data to an Internet solar portal at regular intervals.

To do so,

a) the inverter must be connected to a DSL router or to a network with Internet access
or

b) the inverter must have an integrated analogue modem or wireless modem (GSM, available as an accessory).

Version a) requires a DSL connection. If your inverter is located close to the building and you already have a DSL connection, you can use the available connection for transfer.
In the case of data transfer via DSL, a max. of 300 inverters can be networked.

Note: If the inverters are connected to the Internet by DSL router in the local network, both direct retrieval of the log data as well as transfer of the log data of all connected inverters is possible through a solar portal.

Version b)

To transfer the data to a solar portal with a modem, first connect the inverter via the Ethernet/crossover cable. You will only need one modem: the inverter with the modem then assumes the function of a router for the other inverters.

Version b) with an analogue modem requires the inverter to be connected to a separate analogue telephone connection or an analogue extension of a telecommunications system. This requires a telephone connection close by. The inverter must be connected to the telephone connection at all times.

For version b) with a wireless modem, you will require a SIM card from a mobile phone provider. There must also be adequate wireless reception at the point of installation.

Make sure that the APN (access point name) is set correctly. To do this, use the "Settings" page in the "GSM-Link" configuration tool (see section Installing GSM modem).
You will find a detailed description on our website.

ATTENTION

Inadequate reception quality, e.g. in areas with weak network coverage, can lead to **connection problems** and to the GSM modem **dialling into the grid too often**. Depending on the price model of the GSM contract, this can result in **increased costs**.

The reception quality is also affected by the weather. We recommend testing the reception with a normal mobile telephone for a few days prior to installation to ensure that adequate reception is possible despite differing weather conditions.

Note that the antenna position depends on the maximum cable length of the GSM antenna of 8 m!

The number of inverters that can be connected to a network is principally only limited by the available IP addresses. In practice, a maximum of 30 inverters can be networked when transferring data via GSM or analogue modem.

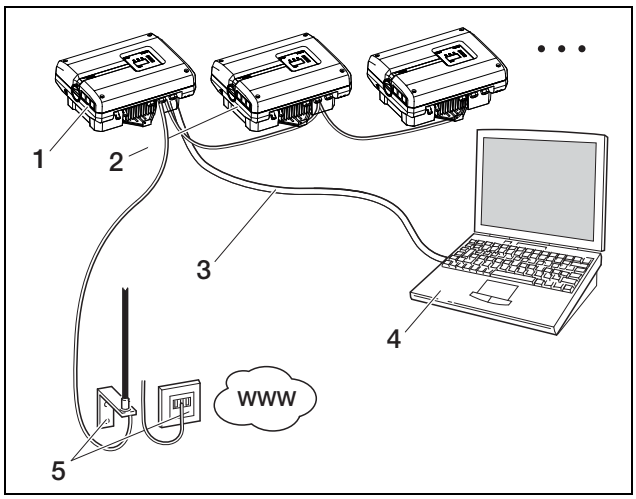


Fig. 24: *Connecting several inverters through the Ethernet and transferring data via modem*

1 Inverter with an integrated modem (analogue or GSM)
2 Additional inverters (without a modem), max. 29
3 Ethernet/crossover cable
4 Computer (for configuration and, if applicable, direct retrieval)
5 Telephone connection box or mobile communications antenna (depending on the modem being used)

Note: For installations with several (max. 30) inverters, you will only need **one** modem.

Situation 4: Remote retrieval of yield data

You can also connect to the inverter remotely instead of through a local network. This may possibly involve additional connection costs.

Similar to situation 3, the inverter must either

a) be connected to a DSL router or

b) have a modem (analogue or GSM) installed.

Version a) Inverter with DSL connection to the Internet

To ensure the inverter can actually be accessed via the Internet, several requirements must be met.

— The inverter must have a fixed IP address in the local network.

— Port forwarding must be configured to the inverter IP address in the router.

— The router must be assigned a fixed IP address by the Internet provider or you must register the router with a DynDNS service to connect the dynamic router IP address with a fixed name.
The inverter can then be accessed over the Internet under the domain name provided by the DynDNS service, and you can connect to the inverter with any Internet browser (see figure 25).

Setting up a port forwarding and a DynDNS service can't be illustrated in detail here due to the vast number of different devices and services available.

Note: DynDNS services can also be found under the designation "Dynamic DNS" and "DNS-Host-Service". In order that the router can be reached under the selected domain name, it informs the DynDNS service of each IP address change. Many of the available routers offer such a function, but a router generally only supports certain DynDNS services.
With some router manufacturers the function for port forwarding is called "Virtual Server" or similar.
For further information see the operating instructions of the router.

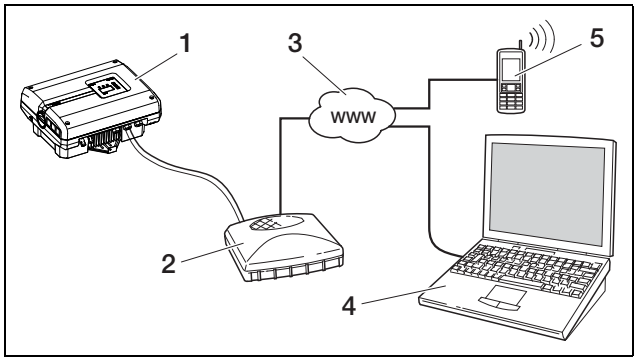


Fig. 25: *Retrieving log data: Inverter connected to the Internet via DSL*

1 Inverters
2 DSL router
3 Internet
4 Computer
5 Internet-compatible mobile phone with browser function

Version b) with an integrated modem

An inverter connected to the telephone network by an analogue modem can only be contacted by a computer when the computer establishes the connection via an analogue telephone connection or via the analogue connection of a telecommunications system (dial-in connection, see figure 26).

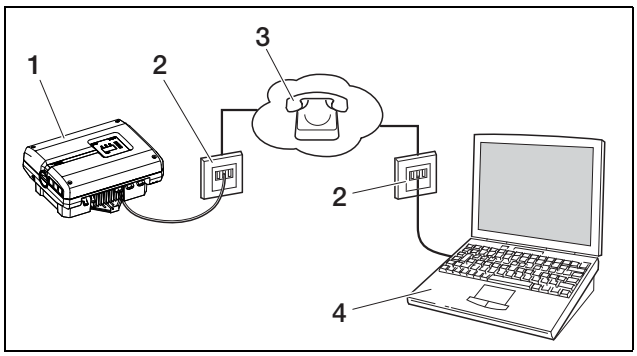


Fig. 26: *Retrieving log data: Inverter connected to a telephone network*

1 Inverter with integrated analogue modem
2 Telephone socket
3 Telephone network
4 Computer with modem

Dialling in with a computer and analogue telephone connection does not function reliably for an inverter with GSM modem. We therefore recommend dialling in via a computer with a GSM modem or a mobile telephone with a modem function (see figure 27).

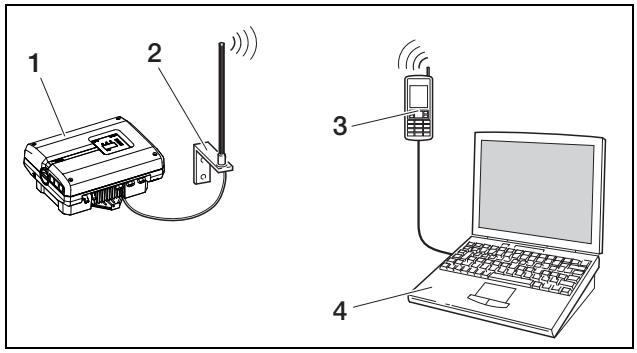


Fig. 27: *Retrieving log data: Inverter connected to a mobile communications network*

1 Inverter with integrated GSM modem
2 Mobile communications antenna
3 Mobile telephone (GSM) with modem function
4 Computer

Overview of the communications interfaces

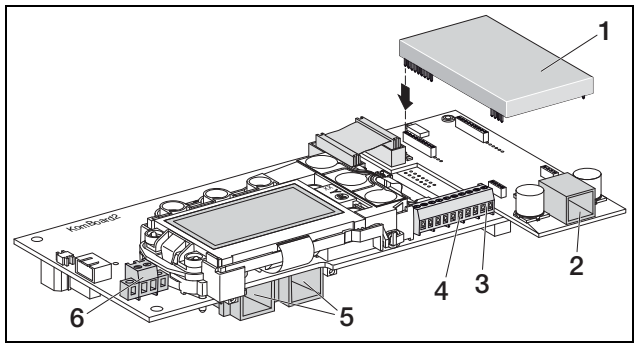


Fig. 28: *Communication interfaces*

1 Modem (accessory)
2 RJ11 socket
3 Terminal for RS485 interface
4 S0 voltage input
5 RJ45 sockets
6 Switch output (S0/AI OUT)

Connecting Ethernet cable

You can connect the inverter to a computer or a computer network (Ethernet 10/100MBit/s) via the RJ45 socket. Use a CAT6 cable with a max. length of 100 m.

- Insert the plug of the Ethernet/crossover cable into one of the corresponding sockets (*5* in figure 28).

Installing analogue modem

Prerequisite for usage of the analogue modem is an analogue telephone connection. Using a modem involves additional costs. Details can be obtained from telecommunications providers.

- Carefully attach modem to circuit board. The uppermost plug pin on the left must be inserted into the uppermost hole in the multipoint connector.

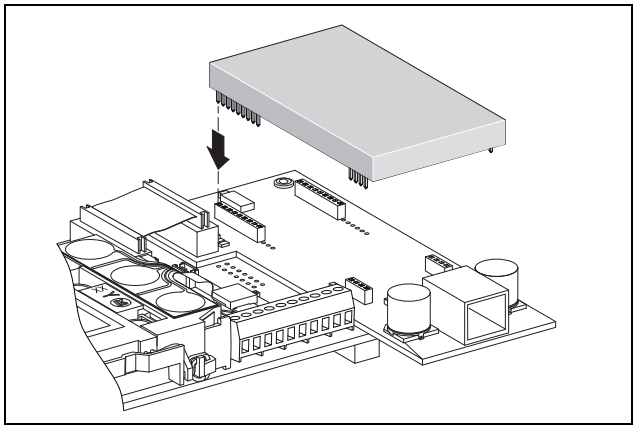


Fig. 29: *Installing the modem*

- Connect the telephone cable (see the following section).

Connecting the telephone cable

The RJ11 socket is used to connect the inverter to an analogue telephone socket or to an ISDN line with a terminal adapter. To use the RJ11 interface, you will require a modem, available as an accessory.

- Insert the plug of the telephone cable into the corresponding socket (*2* figure 28).

Installing GSM modem

In order to use the GSM modem, you will need a SIM card with a contract with a mobile phone provider. The GSM-Link software leaves you free to select your mobile phone provider. Using a modem involves additional costs. Details can be obtained from telecommunications providers.

Not every mobile phone tariff is suitable for use with an inverter!
Before purchasing the SIM data card, discuss the following points with your mobile phone provider and obtain all the access data you require (APN, user name and password).

— You should select a provider whose network supplies the strongest GSM signal at your chosen location.
— The tariff must allow for packet data communication via GPRS.
— Prepaid cards which are charged by mobile calls are not suitable.
— Tariffs which specify particular times for data downloads cannot be used.
— The tariff must permit a data volume of at least 5MB per month and inverter.
— The SIM card must be activated before installation.

- Switch the inverter off for **at least 5 minutes**, see chapter 9.4 ‹Switching the inverter off/decommissioning›.

There are life-threatening voltages in the inverter in the operating state. Only a qualified electrician may open and perform work on the device.

- Open the cover.
- Connect an Ethernet/crossover cable to the communication board (RJ45 interface (network connection)) and connect this to the PC.
- Fasten the cable in such a way that it cannot come into contact with the AC or DC cables.
- Switch the inverter back on again.
- In the Internet browser, enter the serial number, inverter name or IP address in the address line to go to the inverter's web server (e.g. s081230001 or e. g. Powerstocc Excellent 3.0 or e. g. 192.168.1.1).
- Enter the PIN number on the "Settings" page in the "GSM PIN" field.

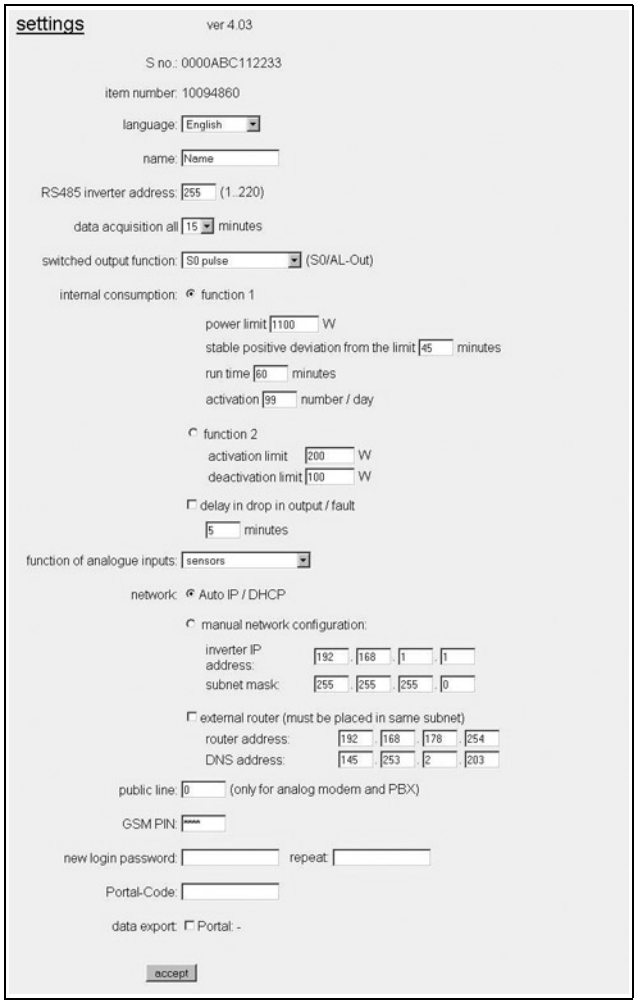

settings
ver 4.03
S no.: 0000ABC112233
item number: 10094860
language: English
name: Name
RS485 inverter address: 255 (1..220)
data acquisition all 15 minutes
switched output function: S0 pulse (S0/AL-Out)
internal consumption: function 1
power limit 1100 W
stable positive deviation from the limit 45 minutes
run time 60 minutes
activation 99 number / day
function 2
activation limit 200 W
deactivation limit 100 W
delay in drop in output / fault
5 minutes
function of analogue inputs: sensors
network: Auto IP / DHCP
manual network configuration:
inverter IP address: 192 . 168 . 1 . 1
subnet mask: 255 . 255 . 255 . 0
external router (must be placed in same subnet)
router address: 192 . 168 . 178 . 254
DNS address: 145 . 253 . 2 . 203
public line: 0 (only for analog modem and PBX)
GSM PIN: ****
new login password: repeat:
Portal-Code:
data export: Portal: -
accept

Fig. 30: *Settings page*

- Launch the "GSM-Link" software.

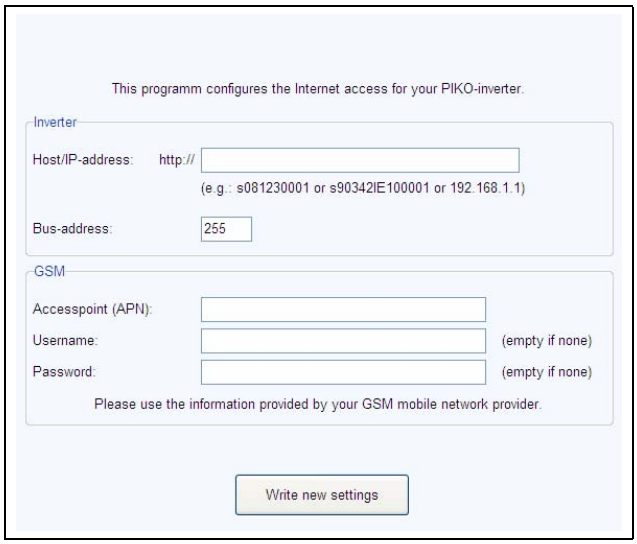

This programm configures the Internet access for your PIKO-inverter.
Inverter
Host/IP-address: http://
(e.g.: s081230001 or s90342IE100001 or 192.168.1.1)
Bus-address: 255
GSM
Accesspoint (APN):
Username: (empty if none)
Password: (empty if none)
Please use the information provided by your GSM mobile network provider.
Write new settings

Fig. 31: *GSM-Link*

- Enter the serial number or IP address of the inverter in the "Host/IP address" field (note: enter the letter S and the inverter's serial number, for example http://S12345FD323456.)
- In the GSM area, enter the data (APN, user name and password) of the SIM card in the corresponding fields and confirm by selecting "Write new settings".
- Switch the inverter off for **at least 5 minutes**, see chapter 9.4 ‹Switching the inverter off/decommissioning›.
- Slide the SIM card into the card holder on the underside of the modem.
- Carefully attach GSM modem to circuit board. The uppermost plug pin must be inserted into the uppermost hole in the multipoint connector.

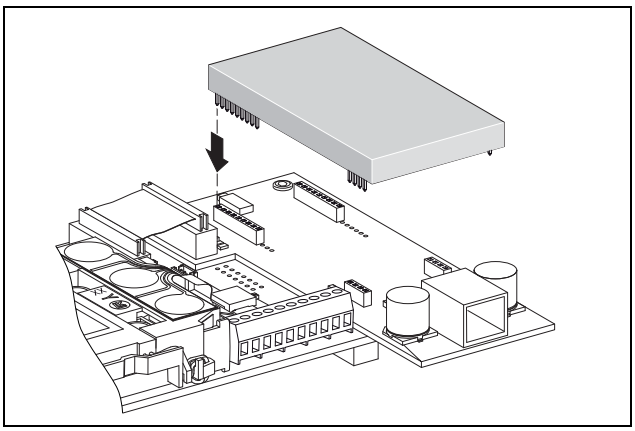


Fig. 32: *Installing the modem*

- Insert the plug of the radio antenna into the GSM modem.
- Install the radio antenna where it will have the best possible reception.
  Note: The reception quality will be displayed on the web server info page after starting up (see section ‹Checking sensors and modem› in chapter 9.2).
- Switch the inverter on again and wait at least 2 minutes.
- In the Internet browser, enter the serial number, inverter name or IP address in the address line to go to the inverter's web server.
- Check whether the modem has been detected (analogue modem) or whether adequate reception quality (at least two bars) is displayed (GSM modem).

Modem status: **Analogue modem identified**

Modem status: GSM signal strength ■■□□□□

Fig. 33: *Modem status*

- Check the current modem status on the "Info page".

Info page

1. analogue input	**0.00 V**
2. analogue input	**0.00 V**
3. analogue input	**0.00 V**
4. analogue input	**0.00 V**
Modem status	**No modem available**
Last portal connection:	–
Number of energy impulses (S0-In):	**0** / 15 minutes

Back to the main page

Fig. 34: *Info page*

- If the "Modem status: GSM signal strength" field is displaying at least two bars, the connection is OK.

Activating data transfer to a solar portal

- The factory setting does not include a solar portal. To use a solar portal, you will need a portal code.

The portal code can be entered in two ways:

1. Via the web server
2. Via the control panel

Entry of the portal code via the web server

- Open the web server's "Settings" page (see illustration 30).
- Enter the code for the intended solar portal in the "Portal code" field.
- Click on "adopt" to save the settings.
  - ➜ The name of the solar portal will appear on the page. The box (☑) next to the portal name was activated automatically.
  - ➜ Data transfer is now activated.

Note: To end the data transfer, see chapter 11.4 (page 49).

- Check that the connection is OK.
- The inverter connects automatically to the portal. Enter the words "go online" in the "Portal-Code" field to initialise a manual connection. (see "Entry of the portal code via the control panel" on page 25).
- Confirm by clicking on "adopt".
- Open the "Info page".

If a value in minutes is stated in the "last connection to portal" field, there is a connection to the solar portal.

You can then register on the solar portal and use the inverter to create a system and/or add the inverter to this system.

Entry of the portal code via the control panel

- Call up the "Settings" menu in the main menu.

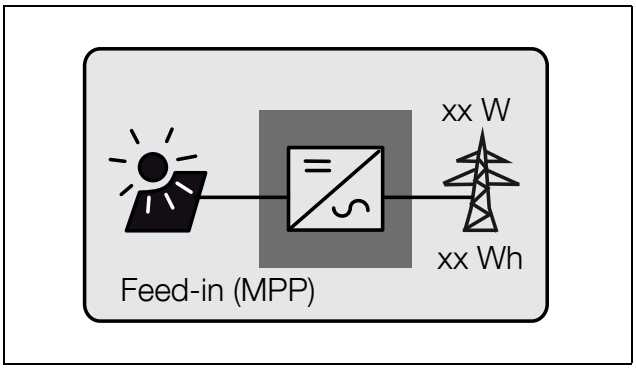


Fig. 35: *Main menu, menu settings selected*

- Go to the "Communication" menu and select the "Portal configuration" menu
- Select the "Code:" entry field with the arrow keys.

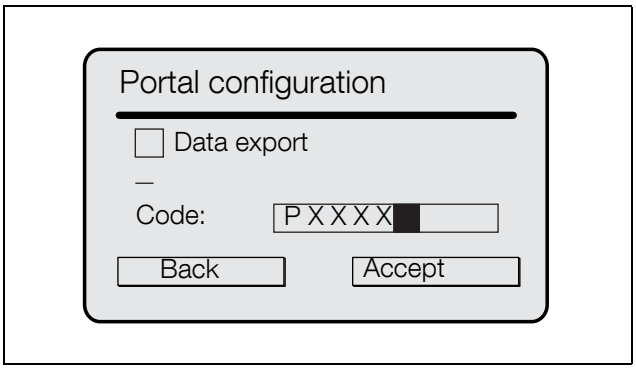


Fig. 36: *Entry of the portal code*

- Enter the portal code (see section “Calling up main menu and navigating” on page 38).
- Confirm the entry with the "Accept" function.

The data export is activated (recognisable by the cross in front of Data export). The name of the solar portal is shown. The data export to the solar portal is executed.

Note: Under normal circumstances, the data becomes visible at the solar portal 20 minutes following the data export. The transfer time can increase when the connection is impaired (e. g. poor wireless connection).

8.7 Installing accessories

If available, now install accessories such as sensors or ripple control receiver.

⚠ DANGER

Risk of death due to electrical shock!

Single-insulated cables from communication components may come into contact with parts carrying grid voltage if the insulation is damaged.

- Only connect double-insulated cables to the inverter.
- Fasten the cable in such a way that it cannot come into contact with the AC or DC cables.

ATTENTION

The communication board may be damaged by electrostatic discharge.

- Touch a grounded point, for example the holder for the housing screw connection on the bottom right, before touching the circuit board.

Overview of the accessory interfaces

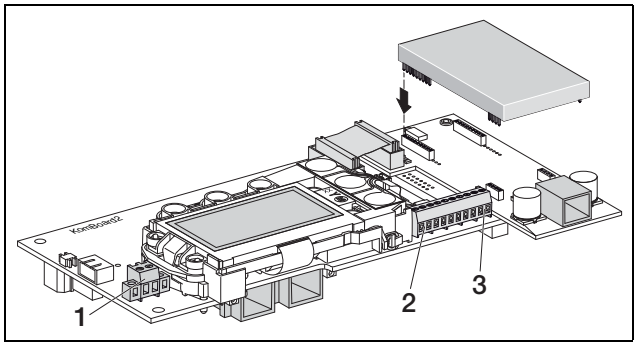


Fig. 37: *Connections*

1 Switch output (S0/AI OUT)
2 Terminal for analogue interfaces
3 RS485 interface

Connect switch output (S0/AI OUT)

The switch output S0/AI-OUT can be occupied with the following functions:
— S0 interface
— Alarm output
— Switching of devices (internal consumption)

S0 interface: The switch output functions as a pulse output as described in DIN EN 62053-31 with a constant rate of 2000 pulses per kilowatt hour. Using a suitable receiver device, such as an energy meter or a display, you can record and display the energy yield of your photovoltaic system.

Alarm output: The switch output functions as a potential-free NC contact. It opens when a malfunction occurs (see ‹Faults› on page 41).

Internal consumption: The switch output functions as a potential-free NO contact. It closes when the set conditions are fulfilled (see section ‹Setting the conditions for switching on devices (internal consumption)› on page 32).
For more information, refer also to the text and image in section ‹Internal consumption›, on page 10.

Max. load	100 mA
Max. voltage	250 V (AC or DC)
Connections	Neutral polarity

Table 6: *Switch output technical data*

Note: You must install a component such as an external load relay between the inverter and the consumer device. Do not connect any consumer devices *directly* to the switch output.

- Connect the lines to the appropriate terminals (fig. 37, position 1).

Connecting the S0 input (energy pulse meter)

The S0 input allows you to record the pulses of an energy meter or a second inverter.

When using the S0 input, the analogue inputs Aln3 and Aln4 are inactive. The web server of the inverter shows the pulses counted on the info page.

- Connect the lines to the terminal (4 in figure 7) according to the terminal assignment (table 39).

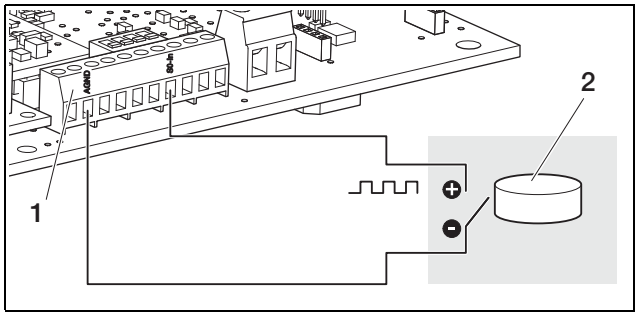


Fig. 38: *Example of the connection of an external energy meter at the S0 In input*

1 S0 In input
2 External energy meter

Connecting analogue sensors

The inverter features four analogue inputs to which you can connect, for example, temperature and irradiation sensors or wind sensors. The additional measured data enable a more precise monitoring of the photovoltaic system.

The sensors must have an output voltage of 0...10 V. An additional voltage supply may be required, depending on the sensor.

Note: When using the S0 input, the analogue inputs Aln3 and Aln4 are inactive.

Note: If the inverter is intended for connecting a ripple control receiver, you cannot connect sensors.

- Connect the lines to the terminal according to the terminal assignment (figure 39 and table 7).

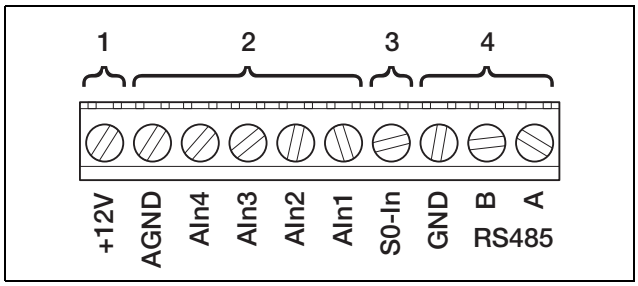


Fig. 39: *Cable terminal*

1 Voltage output
2 Analogue inputs
3 S0 input (energy pulse meter)
4 RS485

Terminal	Designation	Description
1	RS485 A	RS485 A
2	RS485 B	RS485 B
3	GND	Ground for RS485
4	S0 In	S0 input (energy pulse meter)
5	AIn1	Inputs for analogue sensors (0...10 V) or for ripple control receivers
6	AIn2	
7	AIn3	
8	AIn4	
9	AGND	Ground for analogue inputs and S0 input
10	+12V	12 V output for external sensors (not potential-free; max. 100 mA) or for ripple control receivers

Table 7: *Cable terminal connection assignment*

Connecting a ripple control receiver for active power control

Note: The information in this section applies only to systems in Germany.

The inputs for analogue sensors can be used to connect a ripple control receiver for active power control (in accordance with the Renewable Energy Law, as applicable in Germany). This function must be activated via the web server of the inverter to which the ripple control receiver is connected (master) (see section ‹Setting the analogue input functions› in chapter 9.2.1).

The inverter must then be linked via Ethernet or RS485 (figure 40) so that the inverter connected to the ripple control receiver can forward the information received to the other inverters.

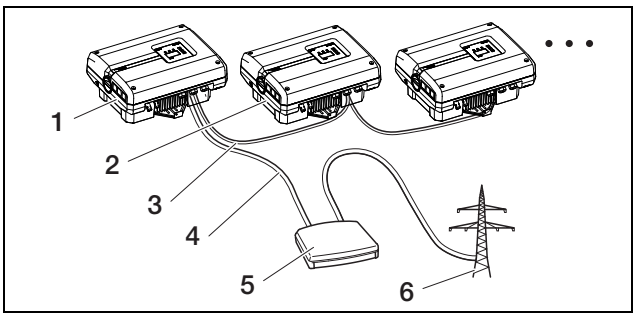


Fig. 40: *Connecting the ripple control receiver for inverters with Ethernet or RS485 connections*

1 Master inverter
2 Additional inverters
3 Ethernet cable, alternatively RS485 connection (3-conductor)
4 5-conductor connection at analogue-in
5 ripple control receiver
6 Grid

- Connect the ripple control receiver lines in accordance with the terminal assignment (figure 41 and table 7).

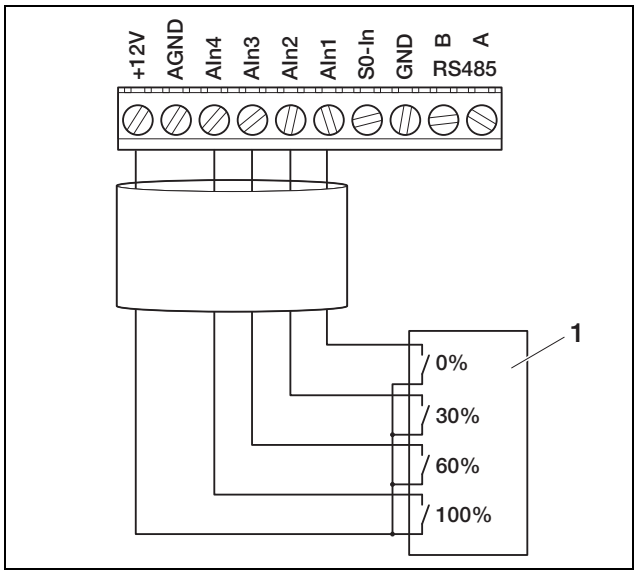


Fig. 41: *Connecting the ripple control receiver to the inverter*

1 Ripple control receiver

Connecting RS485

Connections for the serial **RS485 interface** are found on the terminal for analogue interfaces (figure 39). Using RS485, be connected. Cable lengths of up to 500 m are possible.
Additional components can be connected to RS485. An additional level converter may be required in some cases. Use a shielded line for the connection.

To do this, you must set the bus prestress and bus termination menu items in the user menu to ON (fig. 59).

Note: If other RS485 units are connected in a RS485 network in addition to the inverters (e. g. a display), the number of inverters which can be connected and the maximum cable lengths may be limited.

- For the connection, activate the bus prestress in the user menu of the first inverter and the bus termination in the user menu of the first and last inverters.

Note: If you have the necessary expertise, you can connect the inverter to a serial interface (RS232 or USB) of your computer via a signal level converter. For this type of connection, however, only the current performance data can be accessed. The integrated web server and the stored log data are not available.

- Connect the lines to the terminal (*4* in figure 7) according to the terminal assignment (table 39).

8.8 Set initial commissioning and country of use

For the initial commissioning, sufficient solar irradiation must exist so that a DC input voltage of at least 180 V is available for the inverter.

The country of use must be set so that the network monitoring functions in accordance with the local electricity grid.

- Turn the DC switch to ON.

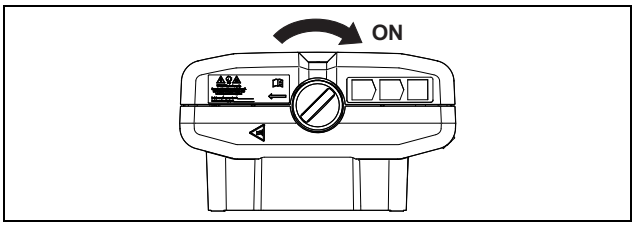


Fig. 42: *DC switch ON*

- Switch on the grid voltage via the line circuit breaker.

The inverter starts up. After the start up, the three LEDs light up briefly. The inverter can now be operated. The screensaver appears and displays the device type. The screensaver is deactivated when a key is pressed twice.

The menu for the country setting appears on the display.

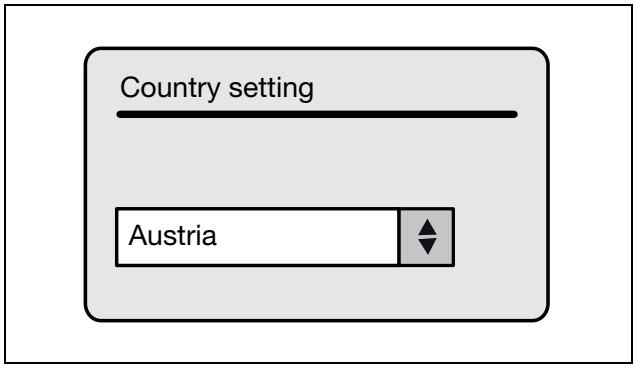


Fig. 43: *Country setting menu*

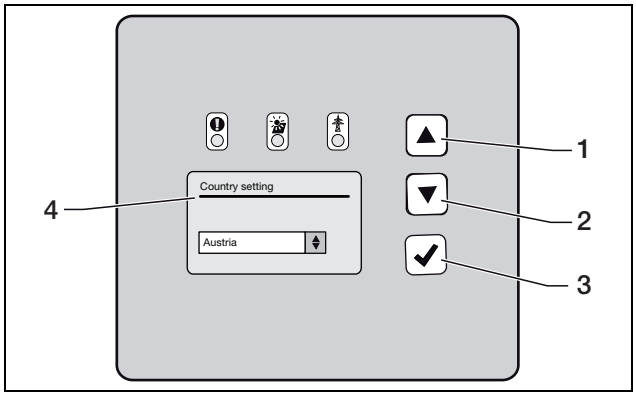


Fig. 44: *Display on the inverter*

- Press the arrow keys (1 or 2) to select the desired country.
- Press the Enter key (3) to go to the confirmation window.
- Press the arrow keys (1 or 2) to switch between "NO" and "YES" choices.
- Press the Enter key (3) to confirm your selection.

Note: The country setting is now permanently fixed. The country setting menu can no longer be called up.

8.9 Closing the housing

- Fasten all cables with a cable tie to the recesses in the protective plate.
  Make sure that all cables run directly over the protective plate and do not project laterally **over** the protective plate.

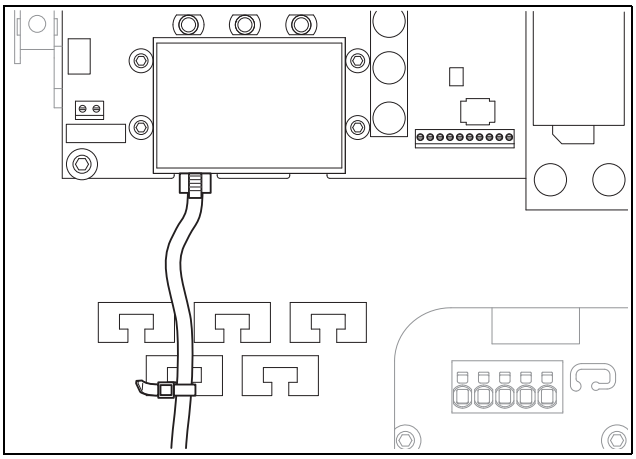


Fig. 45: *Fastening cable to protective plate*

- Screw all union nuts together with sealing ring tightly onto the cable screw connection. Recommended tightening torques: 1,5 Nm (M12) and 8 Nm (M25).
- Check whether all lines are securely connected and cannot loosen on their own.
- Remove any foreign objects from the inverter (tools, wire cuttings, etc.).
- Fit the cover and bolt it tight (5 Nm).

9 Commissioning and de-commissioning

9.1 Switching on the inverter

- Turn the DC switch to ON.

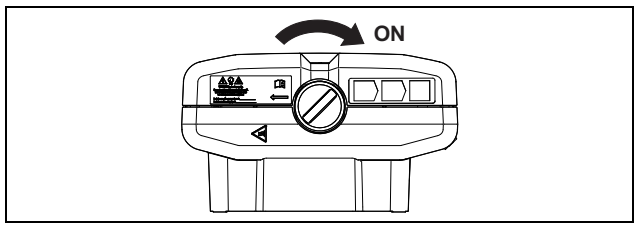


Fig. 46: DC switch ON

- Switch on the grid voltage via the line circuit breaker.

The inverter starts up. After the start up, the three LEDs light up briefly. The inverter can now be operated. The screensaver appears and displays the device type. The screensaver is deactivated when a key is pressed twice.

The main menu appears on the display.

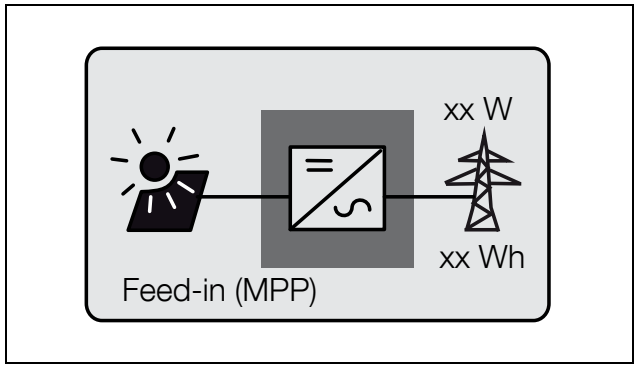


Fig. 47: Main menu

Now you can call up the menus, retrieve data and adjust settings with the control buttons (see menu structure as of page 38).

The yellow LED lights up and the device automatically carries out the required tests according to DIN VDE 0126. If the yellow LED does not light up, the input voltage may be too low.

When the tests have been successfully completed, the green LED lights up and the inverter begins feeding in current to the grid.

If the green LED does not light up, the input voltage or the power may be too low or a fault has occurred (see the chapter "Fault correction").

Note: The time of day must be set on the inverter (see "Settings menu" on page 40). This ensures that the downloaded log data have the correct time entry. When the inverter is connected to a solar portal, the time of day of the solar portal will be adopted.

9.2 Setting up communication and accessories

Perform the remaining setup using the web server of the inverter.

Note: You can change all settings which you make at any time and as often as you like with the exception of the country of use.

9.2.1 Configuring settings

- Click on the "Settings" link.
  - ➜ The "Settings" page is displayed.

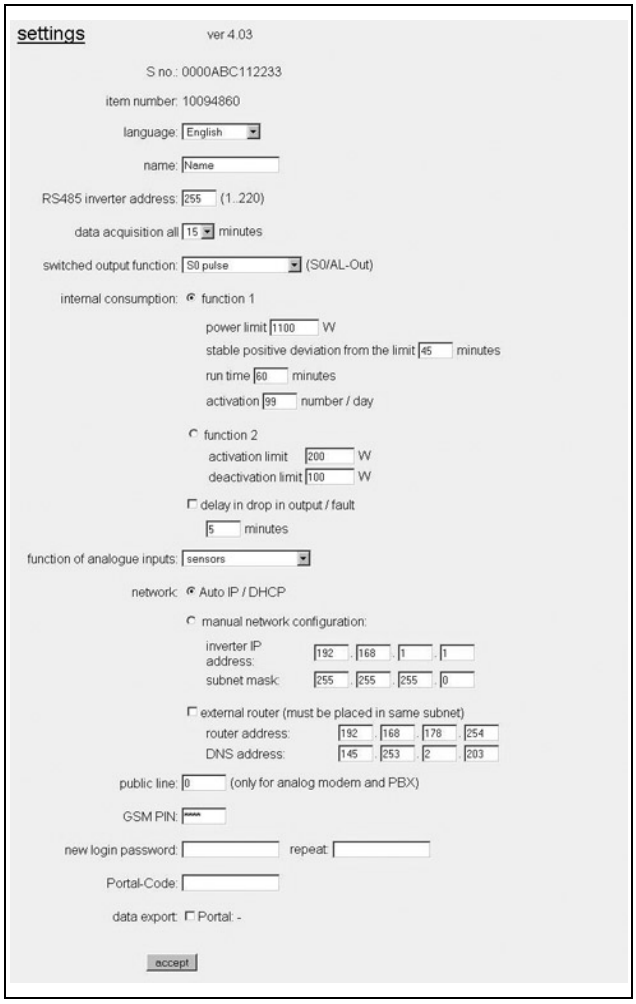

settings
ver 4.03
S no.: 0000ABC112233
item number: 10094860
language: English
name: Name
RS485 inverter address: 255 (1..220)
data acquisition all 15 minutes
switched output function: S0 pulse (S0/AL-Out)
internal consumption: function 1
power limit 1100 W
stable positive deviation from the limit 45 minutes
run time 60 minutes
activation 99 number / day
function 2
activation limit 200 W
deactivation limit 100 W
delay in drop in output / fault
5 minutes
function of analogue inputs: sensors
network: Auto IP / DHCP
manual network configuration:
inverter IP address: 192 . 168 . 1 . 1
subnet mask: 255 . 255 . 255 . 0
external router (must be placed in same subnet)
router address: 192 . 168 . 178 . 254
DNS address: 145 . 253 . 2 . 203
public line: 0 (only for analog modem and PBX)
GSM PIN:
new login password: repeat:
Portal-Code:
data export: Portal: -
accept

Fig. 48: Settings page

Setting	Explanation
S-no.	Inverter serial number
Item number	Item number of the inverter
Language	Selection of the language for the web display
Name	Allocation of a name to the inverter
RS485 inverter bus address	Unit address for the RS485 interface
Data acquisition	Choose between a saving interval of 15 or 60 minutes
Switch output function	Three settings possibilities: – S0-Pulse – Alarm output – Internal consumption
Function of analogue inputs	Two setting possibilities: – Sensors – Active power control (connection of a ripple control signal receiver)
Network	Configuration of the inverter network interface (Ethernet)
Public line	Only required when using an analogue modem (optional accessory) and an analogue telephone system
GSM PIN	PIN for the GSM modem SIM card. For further information on configuration and installation of the GSM modem, see chapter 8.6.
New log-in-password	Change of password
Portal code	Entry field for the portal code for changing the solar portal displayed under 'data export'
Data export	Activation of data transfer to the solar portal displayed (☑) or deactivation (☐)

Table 8: *Web server settings*

Changing the language

You can select a different language for the web server from the drop-down list.

- Select the intended language.
- Click on "Accept" to save the settings.

Changing the name

You can assign a name of your own choosing to the inverter. When connecting the browser to the web server you can then use the name instead of the serial number. Access with the serial number remains possible.

- Type in the name you have chosen. The letters a–z, A–Z and numbers 0–9 are all permitted. Umlauts, spaces or special characters are not permitted.
- Click on "Accept" to save the settings.

Note: Make a note of the new name for the inverter. The name is also shown in the display of the inverter in the "Settings" submenu and can be changed there.

Configuring the RS485 address

If you have linked two or more inverters via RS485, you must set the RS485 addresses of the inverter so that each address is unique.

- Enter the desired address in the field "Inverter bus (RS485) address".
- Click on "Accept" to save the settings.

Changing the data capture (saving interval)

When selecting the saving interval, you have the option of a 15-minute or 60-minute period between the saving procedures. The internal memory can store the data for approximately 100 days if the 15-minute period is selected and for about 400 days with the 60-minute period.

The inverter data are only saved in the unit for a limited time. When the internal memory is full, the oldest data will be overwritten.

To save the data on a long-term basis, you can either transfer the data to a solar portal or download them to a computer.

- Select the desired saving interval.
- Click on "Accept" to save the settings.

Setting the switch output function

- Select from the following options:
  - S0 pulse
  - Alarm output
  - Internal consumption, see section “Setting the conditions for switching on devices (internal consumption)” on page 32
- Click on "Accept" to save the settings.

Setting the conditions for switching on devices (internal consumption)

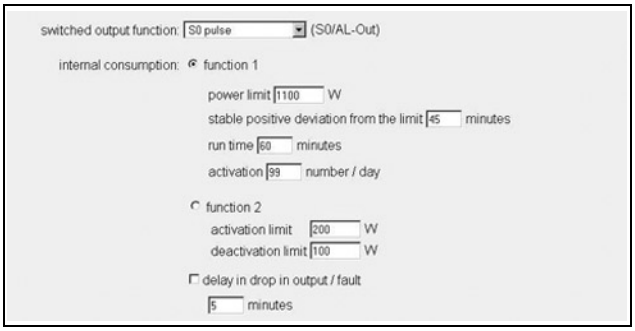

switched output function: S0 pulse (S0/AL-Out)
internal consumption: function 1
power limit 1100 W
stable positive deviation from the limit 45 minutes
run time 60 minutes
activation 99 number / day
function 2
activation limit 200 W
deactivation limit 100 W
delay in drop in output / fault
5 minutes

Fig. 49: *Setting conditions for internal consumption*

- Choose between functions 1 or 2 and enter values.
  - Function 1

Power limit	This is the minimum power (in watts) that must be produced before the consumer is switched on. You can enter any value from 1 watt to 999,000 watts.
Stable exceeding of the limit	This is the period (in minutes) during which the inverter must produce at least the power set in the "power limit" before the device is switched on. You can enter any value from 1 minute to 720 minutes (= 12 hours).
Run time	The connected consumer is switched on for this period (in minutes) when both of the above conditions have been met. You can enter any value from 1 minute to 1440 minutes (= 24 hours). The run time ends when the inverter shuts off. The run time is ended and not continued again if the inverter has not produced any current for three hours.
Activation	The number indicates how often internal consumption is activated each day.

Table 9: *Internal consumption function 1*

  - Function 2

Activation limit	This is the minimum power (in watts) that must be produced before the consumer is switched on. You can enter any value from 1 watt to 999,000 watts.
Deactivation limit	The consumer is switched off when the power generated falls below this value.

Table 10: *Internal consumption function 2*

  - Delay in drop in output / fault

Short term interruptions or drops in output can occur during operation. In order that these events do not result in the disconnection of the device, a delay time can be set. Following the set period, the inverter shuts the consumer off in the event of an enduring fault or drop in output.

- Click on "Accept" to save the settings.

Setting the analogue input functions

- Select whether the analogue inputs should be used for connecting sensors or a ripple control receiver for active power control.
- Click on "Accept" to save the settings.

Configuring the network

As the standard default setting, the option "Auto IP / DHCP" is activated. This means that the inverter acquires its IP address from a DHCP server or automatically generates itself an IP address in the area 169.254.XXX.XXX. A DHCP server can be, for example, a DSL router. A DHCP server (Dynamic Host Configuration Protocol) is a service that administers and distributes the IP addresses and the network configuration in a network.

Note: The "External router" option must be activated in the web server for an Internet connection with a DSL router.

Manual network settings of the inverter:
Entering the IP address of the router and the address of the DNS server in the web server

automatic network settings of the inverter: When a DHCP server is present, the inverter determines the IP address of the router and the DNS server automatically. In the following two cases, the network settings must be entered manually:
- problems establishing an Internet connection
- no DHCP server for generating the IP address

- The "Auto-IP/DHCP" option is suitable for most applications (figure 50).

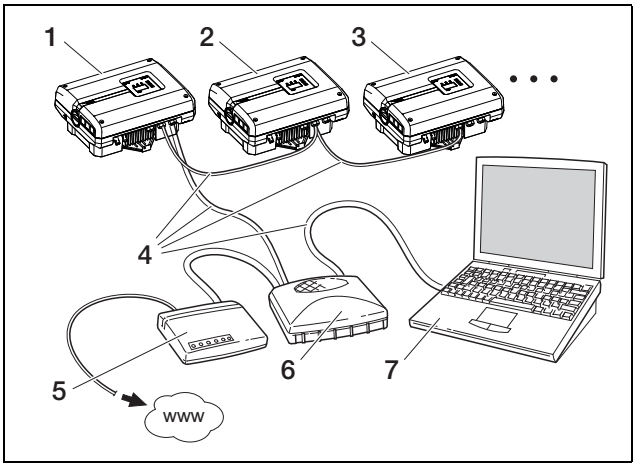


Fig. 50: *Network settings with automatic network configuration for an external DSL router (◉ Auto IP/DHCP, ☑ external router)*

1 Inverter 1 – Auto-IP / DHCP
2 Inverter 2 – Auto-IP / DHCP
3 Inverter 3 – Auto-IP / DHCP
4 Ethernet cable
5 DSL router – with DHCP server
6 Switch/hub
7 Computer with network setting "Obtain IP address automatically"

Network with fixed IP addresses

A fixed IP address assignment ("Manual network configuration" setting) is only required in a few cases:

— You have a local network (Ethernet) with fixed IP addresses and want to integrate the inverter into the network (figure 51).

— Or you operate the inverter through a DSL connection with router and want to connect to the inverter remotely via the router (figure 52).

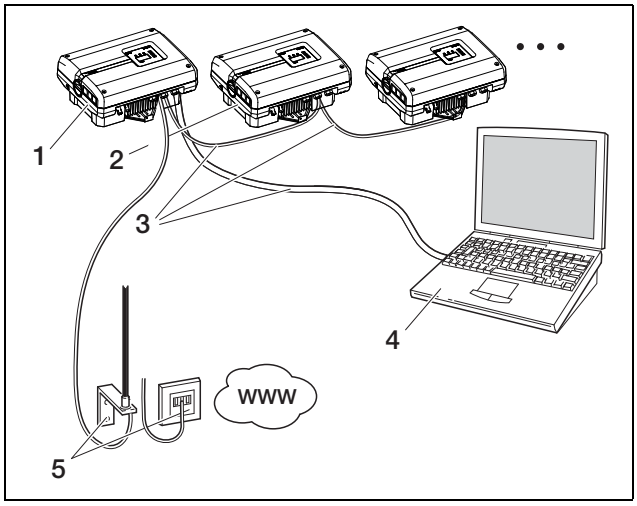


Fig. 51: *Network settings with manual network configuration for analogue or GSM communication, subnet screen 255.255.255.0 (☐ external router)*

1 Inverter with integrated modem (analogue or GSM) – inverter 1 - IP address, e.g. 192.168.1.2
2 Optional additional inverters (without modem) – inverter 2 - IP address, e.g. 192.168.1.3
3 Ethernet cable
4 Computer – IP address, e.g. 192.168.1.250
5 Telephone connection or mobile communications antenna

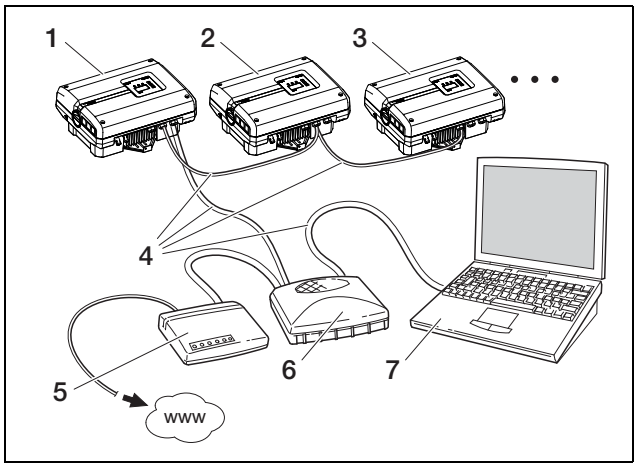


Fig. 52: *Network settings with manual network configuration for external DSL router, subnet mask: 255.255.255.0, ☑ external router*

1 Inverter 1 – IP address, e.g. 192.168.1.2
2 Inverter 2 – IP address, e.g. 192.168.1.3
3 Inverter 3 – IP address, e.g. 192.168.1.4, etc.
4 Ethernet cable
5 DSL router – IP address, e.g. 192.168.1.1
6 Switch/hub
7 Computer – IP address, e.g. 192.168.1.250

Note: The factory default setting of the DNS server address is 145.253.2.203, and it provides the alternative name resolution in the Internet. Do not change this setting, as the export of log data to a solar portal may otherwise not function any more.

- Activate the "Manual network configuration" setting if you wish to assign a fixed IP address. Enter the IP address and subnet mask.

Note: The changed settings take effect immediately upon clicking on "Accept". Your inputs may have the consequence that the inverter is no longer accessible through the current connection.

- Click on "Accept" to save the settings.
- If the inverter is to use an external router to send data to a solar portal, activate the option "external router" and enter the IP-address of the router.
- Click on "Accept" to save the settings.

Entering the public line number (for analogue modems only)

- If applicable, enter the public line number.
- Click on "Accept" to save the settings.

Entering the PIN code (for GSM modems only)

You must enter the PIN code that you received from your mobile phone provider in the configuration of the inverter **before** you install the GSM modem with the SIM card.

- Enter the PIN code of the GSM card.
- Click on "Accept" to save the settings.

Note: If you subsequently change your mobile phone provider, **first** enter the new GSM PIN in the web server of the inverter and **then** replace the SIM card in the GSM modem.

Changing the password

You can change the preset log-in password on the integrated web server.

- Type in the intended password. The letters a–z, A–Z and numbers 0–9 are all permitted. Umlauts, spaces or special characters are not permitted.
- Type the password into the "Repeat" field again.
- Click on "Accept" to save the settings.

Note: Your old password becomes invalid immediately after the password change. You should therefore note the password as a precaution.
Forgotten the password? Our customer service is on hand to assist.

Note: The user name cannot be changed.

9.2.2 Checking sensors and modem

- On the main page of the web server, click on the "Info page" link.
  ➜ The "Info page" window opens.

Info page

1. analogue input	**0.00 V**
2. analogue input	**0.00 V**
3. analogue input	**0.00 V**
4. analogue input	**0.00 V**
Modem status	**No modem available**
Last portal connection:	–
Number of energy impulses (S0-In):	**0** / 15 minutes

Back to the main page

Fig. 53: Info page

Entry	Explanation
x- analogue input	Shows the voltage which is currently available on the analogue input x
Modem status	Shows the modem status: – When the analogue modem is connected correctly, "Analogue modem identified" is displayed. – When the GSM modem is connected correctly, the GSM signal strength is displayed. – When the modem is connected incorrectly or not available, "No modem available" is displayed.
Last portal connection	Displays how many minutes ago the inverter last transferred data to the solar portal (when the function is active)
No. of energy pulses	Displays the number of energy pulses per time unit occurring at the S0 interface

Table 11: Info page

- Check whether the modem has been detected (analogue modem) or whether adequate reception quality (at least two bars) is displayed (GSM modem).

Modem status: **Analogue modem identified**

Modem status: GSM signal strength ■■□□□□

Fig. 54: *Modem status*

- When the reception quality is too low, try another location for the GSM antenna.
  Please note that the reception quality also depends upon weather conditions.

Note: Reception quality which is inadequate can lead to connection problems and to the GSM modem dialling into the net too often. Depending on the price model of the GSM contract, this can result in increased costs.

- Click on "Back to home page" to display the home page again.

9.2.3 Disconnecting

- Close the browser window to disconnect from the web server of the inverter.

9.3 Handover to the operator

After successful installation and commissioning, give the inverter and this manual to the operator. Advise the operator about the following points:

- The position and function of the DC switch and the AC line circuit breaker.
- Safety when handling the device.
- Appropriate procedure when checking and servicing the unit.
- Meaning of the LEDs and the display messages.
- Contact person in the event of a fault.

9.4 Switching the inverter off/decommissioning

When carrying out maintenance and repair work, the inverter must always be de-energised and secured against being switched on again.

The inverter is only de-energised after the following work steps have been carried out.

⚠ IMPORTANT INFORMATION

These work steps must be performed before carrying out any work on the inverter!

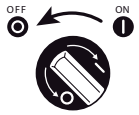
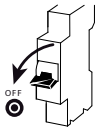
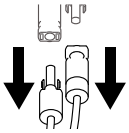
1.		Switch off DC switch
2.		Switch off line circuit breaker For internal consumption: Switch off line circuit breaker for the control of internal consumption.
3.		Secure it against reactivation.
4.		Disconnect DC lines
5.		Wait five minutes (discharge time of the capacitors)

Table 12: *De-energise the inverter*

The following dangers exist when working on the inverter:

	Danger due to electrical shock! Always disconnect the device from the power supply during installation and before maintenance and repairs (see Table 3).
	Danger due to electromagnetic fields! Persons with pacemakers, metallic implants or hearing aids should avoid proximity to systems with inverters.
	Risk of burns from hot parts! Some of the inverter components can reach temperatures of over 80 °C during operation. Do not touch hot components.
	Risk of fire due to hot parts! Be absolutely sure to observe the conditions in the "Installation" chapter (page 13) when choosing the installation location.
	Burns from arcs! Cables must never be removed from the device during operation as this can cause dangerous arcs. First de-energise the DC side, then remove plug-in connectors!
	Danger due to electrical discharge! Wait five minutes after de-energising the inverter!
	Warning! Property damage! Property damage to the device, lost earnings or increased telephone fees can result. The instructions refer precisely to the type of and remedy for potential property damage.

Table 13: *Warning symbols*

9.5 Servicing/maintenance

⚠ DANGER

Risk of death due to improperly performed work!

Work performed improperly can cause life-threatening situations. Only qualified electricians or appropriately trained persons may perform work on the inverter.

Once correctly installed, the inverter operates nearly maintenance-free.

- Check the cable connections and plugs at least once a year.
  If there are loose connections, damaged cables, etc., switch off the inverter immediately.

Damage may only be repaired by qualified electricians.

9.6 Disassembly and disposal

To disassemble the inverter, proceed as follows:

⚠ DANGER

Risk of death due to electrical shock!

There are life-threatening voltages in the inverter in the operating state.

- Switch off the unit completely (DC side and AC side) before all work.
- Wait at least five minutes after switching off until the capacitors have discharged.

- Switch off the inverter as described in chapter 9.4.
- Open the cover of the inverter.
  Loosen the terminals and cable screw connections and remove all DC and AC-cables.
- Close the cover of the inverter.
  Loosen the screw on the underside of the inverter and lift the inverter off the wall mount.
- Disassemble the wall mount.

Disposal

Dispose of the inverter properly and in accordance with the applicable regulations.

The box of the inverter is made of cardboard and can be recycled as paper. Plastic parts and the packaging sack can be sorted to plastic recycling.

10 Inverter operating characteristics

The inverter will work automatically after commissioning, meaning that regular operation is not necessary.

As soon as the photovoltaic modules generate sufficient current, the inverter begins feeding into the grid.

10.1 Display field

The inverter indicates the respective operating status through three LEDs and an display. You can also query operating values and enter settings on the display.

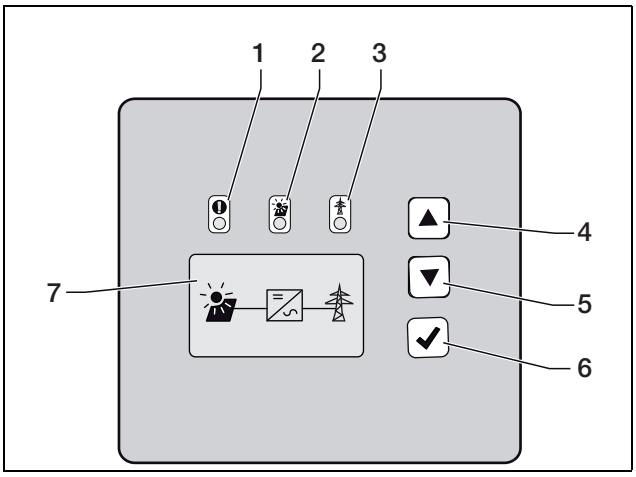


Fig. 55: *Control panel components*

1 "Fault" LED (red)
2 "DC" LED (yellow)
3 "AC" LED (green)
4 "UP" arrow key
5 "DOWN" arrow key
6 Enter key
7 Display

Note: The screensaver appears on the screen when you have not pressed a key for several minutes.

10.2 Determine the operating status (operating LEDs)

The LEDs on the front of the device indicate the current operating status.

LED	Explanation
"AC" LED lit green	The green LED signals that the inverter is in feed-in mode if the output voltage of the photovoltaic module is more than 180 V.
"DC" LED lit yellow	The yellow LED signalises the active status of the inverter control system. It lights as soon as the output voltage of the photovoltaic modules exceeds 100 V. When the output voltage falls below 100 V, the yellow light goes out. Once energy is being fed into the mains grid, the yellow "DC" LED goes out and the green "AC" LED lights up.
No LED is lit	The device is operationally ready but the input voltage is less than 100 V. OR: The device is switched off.
"Fault" LED lights up or flashes red OR: "DC" LED flashes yellow	A fault has occurred. Remedial measures can be found in chapter 10.5.

Table 14: *LED indicators in operation*

10.3 Determining the operating status (display)

The operating statuses are shown on the display.

Display	Explanation
Off	Input voltage on the DC side (photovoltaic modules) is too low
Idle	Electronics are ready for operation, DC voltage is still too low for feed-in
Starting	Internal control measurements according to VDE 0126
Feed-in (MPP)	Measurement successful, MPP control (MPP = maximum power point) active
Feed-in regulated	Feed-in power has been regulated due to excessive device temperature

Table 15: *Operating statuses*

10.4 Displaying operating values and changing settings

10.4.1 Calling up main menu and navigating

In order to deactivate the screensaver and call up the main menu:

- press any key.
  The background lighting of the display lights up.
- Press the key once again.
  The screensaver disappears and the main menu appears.

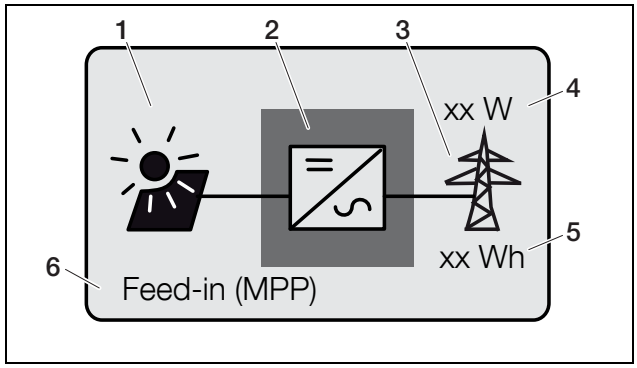


Fig. 56: *Main menu*

1 "DC" menu
2 "Settings" menu
3 "AC" menu
4 Current AC power
5 Fed-in daily output
6 Operational status

— In the "DC" menu you can call up information about the DC input side (see “DC menu” on page 38).
— In the "AC" menu you can view current performance data of the AC output side (see “AC menu” on page 39).
— In the "Settings" menu you can configure the inverter (see “Settings menu” on page 40).

In order to call up a menu:

▲ ▼	Press the arrow keys "UP" or "DOWN" repeatedly if necessary until the symbol for the desired menu is marked.
✓	Press the Enter key. The menu is opened.
<<	After selecting and entering this menu point, one returns to the next menu level.

Table 16: *Call up menu*

10.4.2 Navigation and entry within a menu

Navigation and entry	
ABC	Object with a dashed line means: Object is selected and can be activated with "Enter".
ABC	Object with black background: Object is active and can be edited.
▲ ▼	Select with the arrow keys: letters and numbers
A	Letter or number with black background means: Letter or number is selected and can be changed with the arrow keys.
<<	Letters and numbers are deleted with this function (corresponds to the backspace key).
✓ ca. 3s	Pressing "Enter" for an extended time confirms the entry.

Table 17: *Navigation and entry*

10.4.3 DC menu

- In the "DC" menu you can call up information about the DC input side. Information about the voltage (U), the amperage for direct current (I) and the power (P) is available:

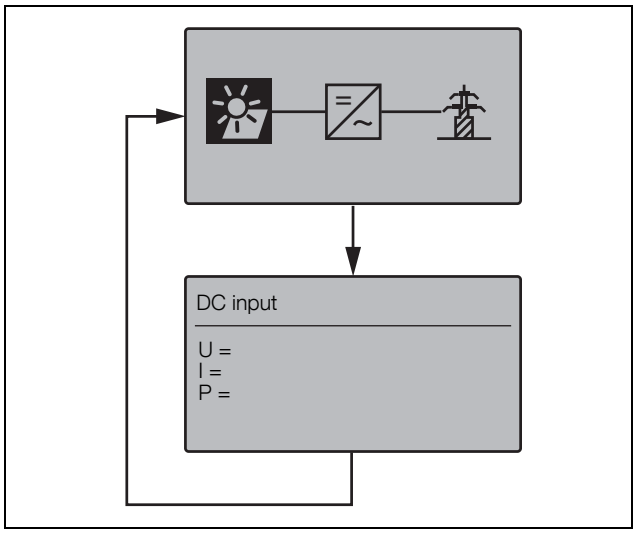


Fig. 57: *"DC" menu*

10.4.4 AC menu

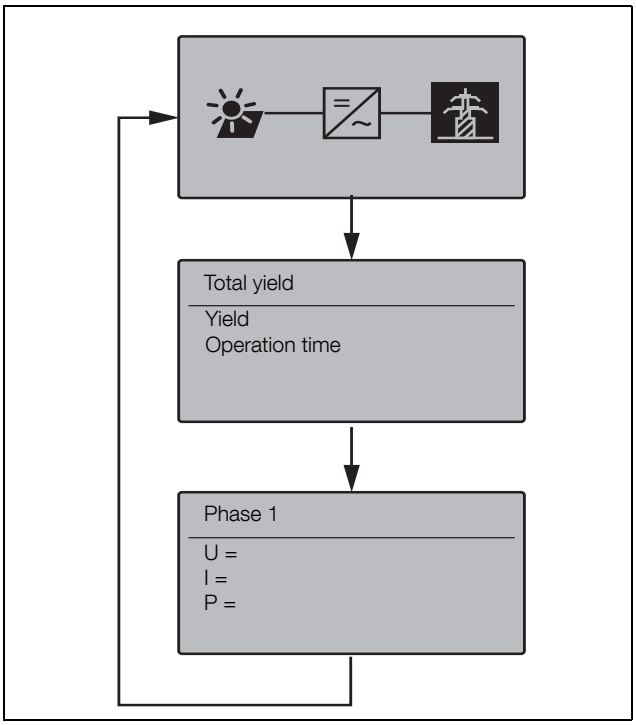


Fig. 58: *"AC" menu*

10.4.5 Settings menu

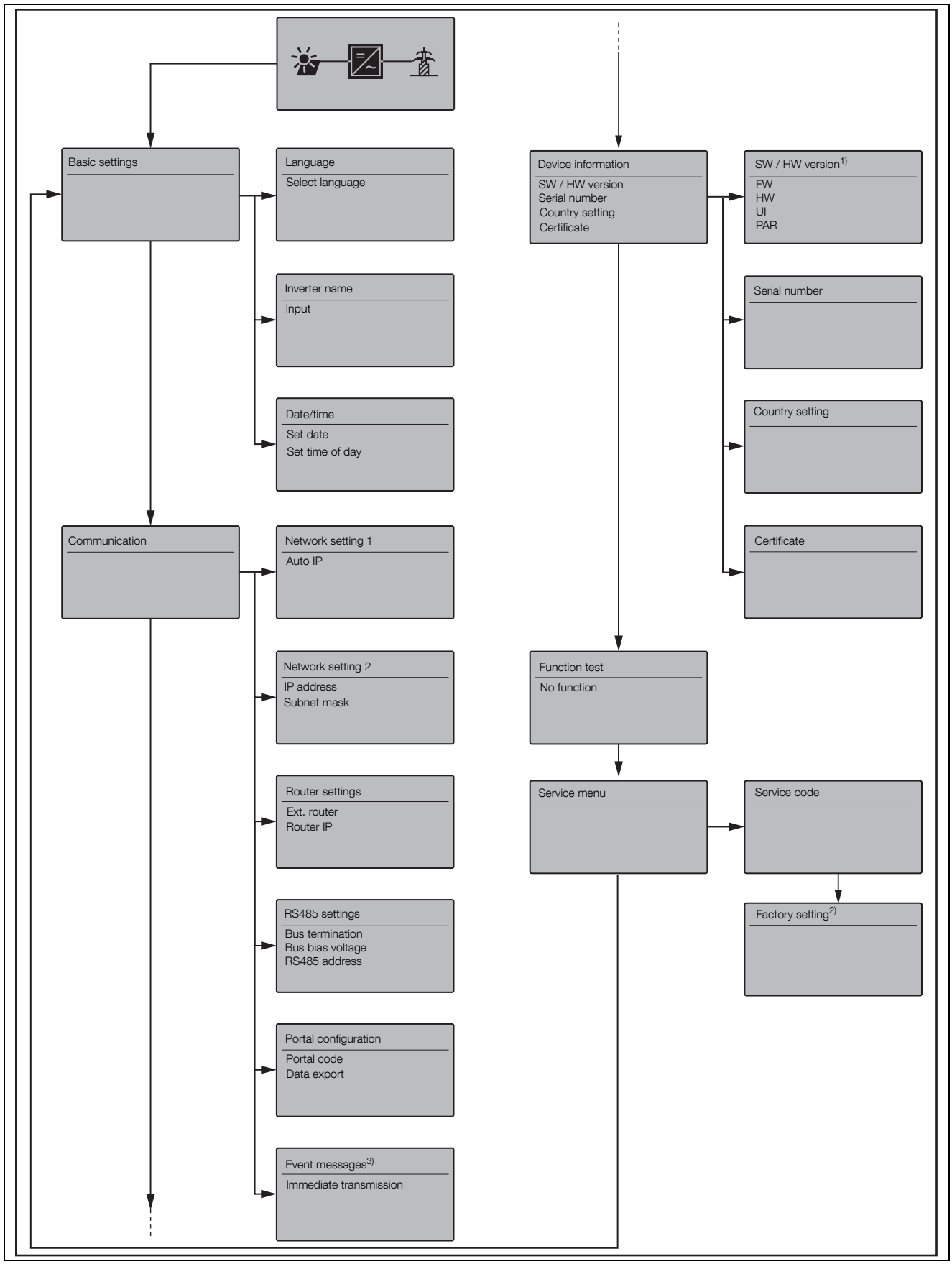


Fig. 59: *Settings menu*

1 **SW/HW version**
Pure display (like type plate)
FW: Firmware version
HW: Hardware version
UI: Software version of the communication board
PAR: Version of the parameter file

2 **Factory settings**
In this menu the inverter can be reset to the factory setting.
Attention: All user settings are lost during this reset. However, the country setting remains unchanged.

3 **Event messages**
Event messages can be faults or other events. The "immediately mailing" option sends the event message immediately following the data capture period to an Internet portal.
Note: When a data flat rate is not present, the data transfer with a GSM or analogue modem can result in higher costs.

Note: The menu structure shown here can differ from the menu structure shown on your device depending upon the version.

10.5 Faults

The inverter interrupts the feed-in and switches off in the event of a fault.

- Check whether the DC switch has been opened.
- Check if the fault is due to a grid power failure or if the fuse between the feed meter and the inverter has tripped.

⚠ DANGER

Risk of death due to electrical shock!

Deadly voltages are present in the inverter. Only a qualified electrician may open and perform work on the device.

If the fuse has tripped, notify the installer; if there is a power failure, simply wait until the grid operator has corrected the problem.

If the fault lasts only a short time (grid fault, excess temperature, overload, etc.), then the inverter will automatically resume operation as soon as the fault has been resolved.

If the fault persists, **notify your installer** or our Customer Support.

Provide the following information:

— Device type and serial number. You will find this information on the type plate on the exterior of the housing.

— Description of fault (LED indicator and display message).

Event list

There is no need to take action when a fault occurs occasionally or only briefly and the device resumes operation. When a fault occurs over long periods or recurs often, the cause must be determined and corrected. The following table should be helpful in the process.

Message on the screen (LED display)	Type of fault	Description	Measure
Event code: 3000 [red and yellow LEDs flash]	Fault system fault	Internal system fault	Contact support when the fault occurs repeatedly or persists.
Event code: 3001 [red and yellow LEDs flash]			
Event code: 3003 [red and yellow LEDs flash]	Fault communication		Contact support
Event code: 3005 [red and yellow LEDs flash]	Fault system fault	Internal AC system fault	Device carries out a test several times and generally overrides. Contact support when the fault occurs repeatedly or persists.
Event code: 3006 [red and yellow LEDs flash]		Internal system fault with respect to power limitation	
Event code: 3008 [red and yellow LEDs flash]		Internal DC system fault	
Event code: 3010 [red and yellow LEDs flash]	Fault communication	Internal communication fault between control system and communications PCB	Check time of day, functionality of the communication PCB and the communications settings. Inverter overrides despite incorrect time stamp. Contact support when the fault occurs repeatedly or persists.
Event code: 3012 [red and yellow LEDs flash]	Fault system fault	DC varistor defective	Replace DC varistor
Event code: 3013 [green LED flashes]	Fault temperature	Excess temperature AC/DC at power level	Check installation conditions and cooling aids. Contact support when the fault occurs repeatedly or persists.
Event code: 3014 [green LED flashes]		Excess temperature of processor	
Event code: 3017 [yellow LED flashes]	Fault generator	Overvoltage at the PV generator	Check the layout and installation of the generator
Event code: 3018	Information	Power limitation through external specifications (grid operator)	No action, as this is only a reaction to an external signal.
Event code: 3019 [red LED lights up]	Fault grid	Power limitation due to a grid fault (increased grid frequency)	Contact support when the fault occurs repeatedly or persists.
Event code: 3020 [yellow LED flashes]	Fault generator	Overcurrent at the PV generator	Check the layout and installation of the generator
Event code: 3030 [green LED flashes]	Fault temperature	Excess temperature AC/DC at power level	Check installation conditions and cooling aids. Contact support when the fault occurs repeatedly or persists.

Table 18: *Event list*

Message on the screen (LED display)	Type of fault	Description	Measure
Event code: 3031 [red and yellow LEDs flash]	Fault system fault	Internal AC system fault	Device carries out a test several times and generally overrides. Contact support when the fault occurs repeatedly or persists.
Event code: 3033 [green LED flashes]	Fault temperature	Internal system fault	Contact support when the fault occurs repeatedly or persists.
Event code: 3034 [red and yellow LEDs flash]	Fault system fault	Internal intermediate circuit fault	Restart inverter. Contact support when the fault occurs repeatedly or persists.
Event code: 3035 [red and yellow LEDs flash]			
Event code: 3036 [red and yellow LEDs flash]		Internal system fault	Contact support
Event code: 3037 [red and yellow LEDs flash]			
Event code: 3038 [red and yellow LEDs flash]			
Event code: 3039 [red and yellow LEDs flash]	Fault parameterisation		
Event code: 3040 [red LED lights up and yellow LED flashes]	Fault arc	Serial arc	Be absolutely sure to check the entire installation of the PV system after each arc fault.
Event code: 3041 [red LED lights up and yellow LED flashes]		Parallel arc	
Event code: 3042 [red LED lights up and yellow LED flashes]		Arc	
Event code: 3043 [red and yellow LEDs flash]	Fault parameterisation	Internal system fault	Contact support
Event code: 3044 [red and yellow LEDs flash]	Fault system fault	Internal AC system fault	Device carries out a test several times and generally overrides. Contact support when the fault occurs repeatedly or persists.
Event code: 3045 [red and yellow LEDs flash]	Fault system fault	Internal AC system fault	Device carries out a test several times and generally overrides. Contact support when the fault occurs repeatedly or persists.
Event code: 3046 [red and yellow LEDs flash]			
Event code: 3047 [red and yellow LEDs flash]		Internal system fault	Contact support when the fault occurs repeatedly or persists.

Table 18: *Event list (cont.)*

Message on the screen (LED display)	Type of fault	Description	Measure
Event code: 3048 [red and yellow LEDs flash]	Fault communication	Internal communications fault	Check the internal lines of communication between the individual PCBs Contact support when the fault occurs repeatedly or persists.
Event code: 3049 [red and yellow LEDs flash]			
Event code: 3050 [red and yellow LEDs flash]			
Event code: 3051 [red and yellow LEDs flash]	Fault system fault	Internal system fault	Contact support when the fault occurs repeatedly or persists.
Event code: 3052 [red and yellow LEDs flash]			
Event code: 3053 [red and yellow LEDs flash]			
Event code: 3054 [red and yellow LEDs flash]			
Event code: 3055 [red and yellow LEDs flash]			Restart inverter. Contact support when the fault occurs repeatedly or persists.
Event code: 3056 [red and yellow LEDs flash]	Fault parameterisation		Contact support
Event code: 3058 [red and yellow LEDs flash]	Fault system fault		No measures necessary. Contact support when the fault occurs repeatedly or persists.
Event code: 3059 [red and yellow LEDs flash]	Fault parameterisation	Faulty parameterisation	Contact support
Event code: 3060 [red and yellow LEDs flash]			
Event code: 3061 [red and yellow LEDs flash]	Fault system fault	Internal system fault	No measures necessary. Contact support when the fault occurs repeatedly or persists.
Event code: 3062 [green LED flashes]	Fault temperature	Internal system fault	No measures necessary. Contact support when the fault occurs repeatedly or persists.
Event code: 3063 [red and yellow LEDs flash]	Fault parameterisation	Internal system fault	Contact support

Table 18: *Event list (cont.)*

Message on the screen (LED display)	Type of fault	Description	Measure
Event code: 4100 – 4119 [red LED lights up]	Fault grid	DC regulatory fault	Contact support when the fault occurs repeatedly or persists.
Event code: 4101 [red and yellow LEDs flash]	Fault system fault	Increased DC current L1	
Event code: 4102 [red and yellow LEDs flash]		Increased DC current L2	
Event code: 4103 [red and yellow LEDs flash]		Increased DC current L3	
Event code: 4104 [red and yellow LEDs flash]		Increased DC current L1	
Event code: 4105 [red and yellow LEDs flash]		Increased DC current L2	
Event code: 4106 [red and yellow LEDs flash]		Increased DC current L3	
Event code: 4120 – 4139		Internal software fault	
Event code: 4107 [red and yellow LEDs flash]		Internal system fault	
Event code: 4108 [red and yellow LEDs flash]			
Event code: 4150 – 4180 [red LED lights up]	Fault grid frequency	AC grid frequency fault	Check the installation. Contact support when the fault occurs repeatedly or persists.
Event code: 4150 [red LED lights up]	Fault grid	Increased grid frequency	
Event code: 4151 [red LED lights up]		Grid frequency too low	
Event code: 4160 [red LED lights up]		Increased grid frequency	
Event code: 4161 [red LED lights up]		Grid frequency too low	
Event code: 4200 – 4270 [red LED lights up]		AC grid voltage fault	
Event code: 4200 [red LED lights up]		Increased grid voltage	
Event code: 4201 [red LED lights up]	Fault grid	Grid voltage too low	Check the installation. Contact support when the fault occurs repeatedly or persists.
Event code: 4210 [red LED lights up]		Increased grid voltage	
Event code: 4211 [red LED lights up]		Grid voltage too low	
Event code: 4220 [red LED lights up]		Voltage mean value of the last 10 minutes too high	
Event code: 4221 [red LED lights up]		Voltage mean value of the last 10 minutes too high	
Event code: 4271 – 4289 [red and yellow LEDs flash]	Fault system fault	Internal system fault	Contact support when the fault occurs repeatedly or persists.

Table 18: *Event list (cont.)*

Message on the screen (LED display)	Type of fault	Description	Measure
Event code: 4290 – 4300 [red LED lights up]	Fault grid	The grid frequency has changed too quickly	Check the generator installation. Contact support when the fault occurs repeatedly or persists.
Event code: 4300 – 4339 [red and yellow LEDs flash]	Fault system fault	Internal system fault	Contact support when the fault occurs repeatedly or persists.
Event code: 4340 – 4359 [red LED flashes]	Fault residual current	Residual current	Check the generator installation. Contact support when the fault occurs repeatedly or persists.
Event code: 4360 – 4399 [red and yellow LEDs flash]	Fault system fault	Internal system fault	Contact support
Event code: 4400 – 4449 [red and yellow LEDs flash]			Contact support when the fault occurs repeatedly or persists.
Event code: 4450 – 4469 [red and yellow LEDs light]	Fault insulation fault	Insulation fault	Check the generator installation. Contact support when the fault occurs repeatedly or persists.
Event code: 4470 – 4499 [red and yellow LEDs flash]	Fault system fault	Internal system fault	Contact support when the fault occurs repeatedly or persists.
Event code: 4800 – 4999 [red and yellow LEDs flash]			

Table 18: *Event list (cont.)*

11 System monitoring

Also observe the descriptions about communication and accessories in chapter 9.2 from page 30 on.

The inverter regularly records performance data (voltage, power, energy) of the DC and the AC side.

Note: Some of the data will also be shown on the inverter display during operation (see chapter 10.4).

There are two ways of retrieving, displaying and permanently saving all log data:

— Transfer the log data to a solar portal.

— Download the log data with a computer.

You can, of course, make use of both options together.

Transfer the log data to a solar portal.

The data transfer may involve potential additional costs. As a rule, you must register the inverter with the solar portal operator. You can receive further information from our customer support. See also chapter 9.2.1.

The solar portal displays the data on an Internet page and archives them. This enables you to view the status of your photovoltaic system at any time and from anywhere. All you need is access to the Internet (computer, Internet hotspot, mobile phone, etc.).

Downloading the log data onto a computer.

Retrieve the performance data of your photovoltaic system directly from the inverter. To do so, establish a connection to your inverter with a computer. The integrated web server displays the current performance data clearly on HTML pages so that you can access the data with any conventional Internet browser. No special software is needed. In addition, you can download all saved log data and display it using the free visualisation software Powerstocc MasterControl (see chapter 11.3). Alternatively, you can use a spreadsheet application.

11.1 Logging into the web server

- Switch on your computer.
- Only for dialling in via analogue or GSM modem: Establish a dialling connection to the modem in the inverter.
- Open your Internet browser program.

Note: Ensure that the proxy server for LAN connections has been deactivated.
You can find further instructions concerning network settings in the operating system manual for your computer.

- If your computer is connected to the inverter **via a network cable**, enter an "S" into the address line of the browser, followed by the serial number of the inverter (see type plate), for example **http://S12345FD323456**

  ➜ The log-in window for the web server opens.

- If your computer is connected to the modem in the inverter **via dial-up connection**, enter the letters "wr.S" in the browser's address line followed by the serial number of the inverter (see type plate), for example **http://wr.S12345FD323456**.

  ➜ The log-in window for the web server opens.

Note: Instead of the serial number, you can also use the name of the inverter or the IP address, for example **http://name** or for a dial-in connection **http://wr.name** or **http://192.168.1.51** (if the inverter has this IP address).

You can find out how to allocate a name to the inverter or to change the name in section ‹Changing the name› in chapter 9.2.

- Enter user name and password. The factory defaults for user name and password are set as follows:

  User name: pvserver
  Password: pvwr

  You can change the password in the settings of the web server at any time (see section ‹Changing the password› in chapter 9.2). The user name cannot be changed.

- Click on "OK" to confirm your entry.

  ➜ The main screen of the web server will be displayed.

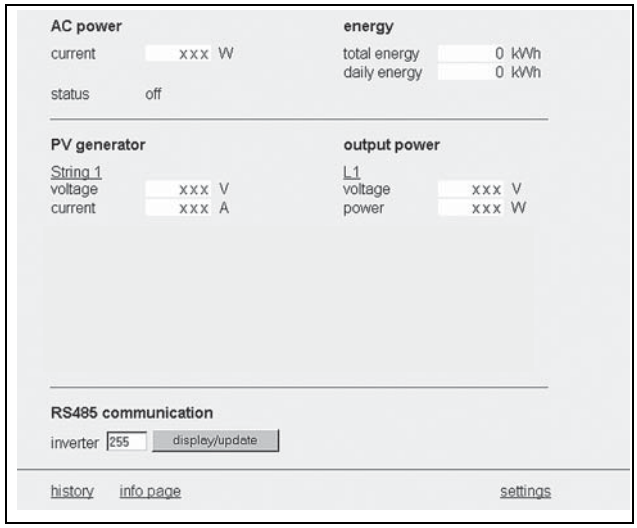


Fig. 60: Main page of the web server

By clicking on the button "Display/update", you can update the data or, when operating several inverters that are linked via an RS485 network, select a different inverter via its RS485 address and access its current performance data.

11.2 Downloading log data

With the log data it is possible to display the yield data of the PV system. Malfunctions can also be determined with the log data.

The log data of the inverter can be downloaded as a DAT or a txt file. (The log data are explained in table 19 on page 49.

Procedure:

- On the main page of the web server, click on the "History" link.
  - ➜ A window with the options "Open" or "Save" opens.

— Option "Open": the data can be opened and processed with a table calculation program.

— Option "Save": the data are saved on your hard drive. After saving, these data can be displayed and further processed.

Note: Regularly create backup copies of your saved log data.

11.3 Displaying log data

The log data include information on your photovoltaic system.

In order to comfortably display the log data, we recommend using the **visualisation software** Powerstocc Master2 (L V2). With this software you can directly access the inverter, download and display the data. You can download this free of charge from the download area of our website www.centrosolar.com

Note: The software Powerstocc Master Control (PMC) cannot import DAT or txt files.

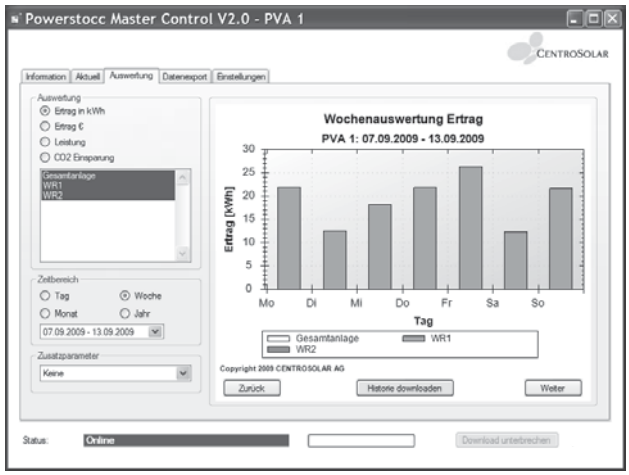


Fig. 61: Visualisation software Powerstocc MasterControl

If you are not using visualisation software, you can display the log data with any conventional spreadsheet program.

The following table 19 lists which measurement values are contained in the log data.

Entry	Explanation
Time	Details in seconds of the time since the inverter went into operation
DC1 U	DC voltage in V
DC1 I	DC current in mA
DC1 P	DC output in W
DC1 T	DC temperature: details for service
DC1 S	DC status: details for service
AC1 U	AC voltage in V
AC1 I	AC current in mA
AC1 P	AC output in W
AC1 T	AC temperature: details for service
AC F	AC frequency: grid frequency in Hz
FC I	Residual current: measured residual current in mA
AIn1 AIn2 AIn3 AIn4	Analogue input voltage: display of the analogue inputs 1 to 4 of the communication board. The measured voltage value in V can be calculated with the value from the table (digits) and the following formula: input voltage [V] = (10/1024) * digits If the S0 input is used to count the energy pulses, both table columns AIn3 and AIn4 give the sum of the energy pulses per log interval. This total value is calculated as follows: E_{total} = AIn3 * 2^{16} + AIn4
ERR	General malfunctions
ENS S	Status of grid monitoring
ENS Err	Malfunctions in grid monitoring
KB S	Internal status of the communication: internal communication status when switching to AC grid.
Total E	Total energy: total fed-in energy in kWh when switching to AC grid.
Iso R	Insulation resistance: insulation resistance in kOhm when switching to AC grid.
Event	POR event, "power on reset": renewed start-up of communication after a loss of AC voltage.

Table 19: *Log data*

Abbreviations

— AC: alternating current, designation for alternating current
— DC: direct current, designation for direct current
— U: voltage in volts [V]
— I: current strength in milliamps [mA]
— P: power in watts [W]
— E: energy in kilowatt hours [kWh]
— F: frequency in Hertz [Hz]
— R: resistance in kiloohms [kohm]
— T: counting unit in points [digits]
— AIn: counting unit in points [digits]
— Time: details in seconds [sec] since the inverter was put into operation

11.4 End data transfer to a solar portal

You can end an activated data transfer to a solar portal at any time.

- Open the setting page of the web server.
- Click the box next to the name of the portal to deactivate the data export to the solar portal (☐).
- Click on "Accept" to apply and save the settings.

Note: To activate the data transfer, see chapter 9.2.3 (page 35).

12 Appendix

12.1 Technical data

Parameter	Unit	Powerstocc Excellent 3.0
Input side (DC)		
Max. PV power	kW	4,3
Rated input voltage ($U_{dc,r}$)	V	400
Max. input voltage ($U_{dc,max}$)	V	900
Min. input voltage ($U_{dc,min}$)	V	160
Max. input current ($I_{dc,max}$)	A	12,5
Max. input current with parallel connection	A	–
Number of DC inputs		1
Number of independent MPP trackers		1
Output side (AC)		
Rated output, cos φ = 1 ($P_{ac,r}$)	kW	3
Max. output apparent power cos φ, adj	kVA	3
Rated output current	A	13
Max. output current ($I_{ac,max}$)	A	13,7
Number of feed-in phases		1
Grid connection		1/N/PE, AC, 230 V
Rated frequency (fr)	Hz	50
Efficiencies		
Max. efficiency	%	96,2
European efficiency rate	%	95,5

Table 20: *Technical data*

Parameter	Unit	Powerstocc Excellent 3.0
Topology: without galvanic separation - transformerless		ja
Internal protection according to IEC 60529		IP55
Protection class according to IEC 62103		I
Surge category according to IEC 60664-1 Input side (PV generator) [1)]		II
Surge category according to IEC 60664-1 Output side (grid connection) [2)]		III
Degree of contamination [3)]		3
Environmental category (outdoor installation)		ja
Environmental category (interior installation)		ja
UV resistance		ja
Minimum cable cross-section of AC connecting line	mm^2	1,5
Minimum cable cross-section of DC connecting line	mm^2	4
Min. fusing on output side		B16, C16
Tightening torque of PE connection, outer	Nm	3
Tightening torque of lid screws	Nm	5
Operator protection		RCCM Typ B 30 mA
Electronic disconnection device integrated		ja
Height	mm	385
Width	mm	500
Depth	mm	222
Weight	kg	22
Max. air throughput	m^3/h	–
Max. noise emission	dBA	<33
Ambient temperature	°C	-20 ... 60
Max. installation altitude	m above sea level	2000
Relative humidity (non-condensing)	%	0 ... 95
Connection technology at input side - MC 4		ja
Connection technology at output side - spring-loaded terminal strip		ja

Table 20: *Technical data (cont.)*

1 Overvoltage category II (DC input):
The device is suitable for connection to PV strings. Long feed cables out of doors or a lightning protection system in the vicinity of the PV system may make lightning protection or surge protection equipment necessary.

2 Surge category III (AC output):
The device is suitable for permanent connection in the grid distribution behind the meter and the line protection fuse. When the connection line travels outdoors over longer distances, surge protection devices may be necessary.

3 Degree of contamination 3:
Conductive contamination is present. Dry, non-conductive contamination becomes conductive when condensation forms.

12.2 Type plate

The type plate is located on the right side of the inverter. You will find the device type and the most important technical data listed on the type plate.

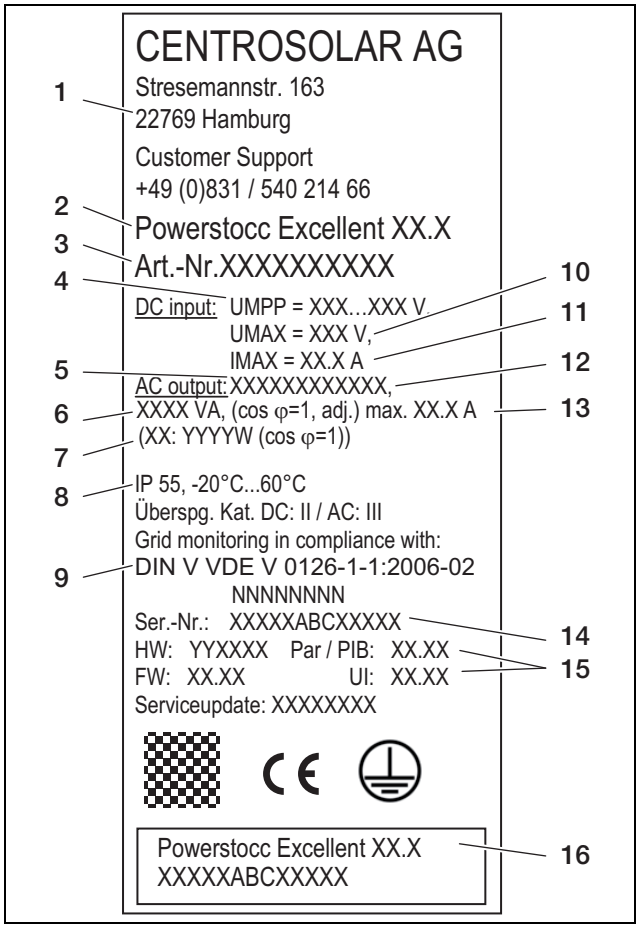


Fig. 62: *Type plate (example)*

1 *Name and address of manufacturer*
2 *Device type*
3 *Item number*
4 *MPP control range*
5 *Number of feed-in phases*
6 *Maximum AC power*
7 *Deviating output with country setting*
8 *Protection type and ambient temperature range*
9 *Requirements conforming to those of the built-in grid monitoring*
10 *Maximum input voltage DC*
11 *Maximum DC input current*
12 *Output voltage (nominal)*
13 *Maximum output current AC*
14 *Serial number*
15 *Version number of hardware, firmware, parameter set and user interface of the device*
16 *Removable guarantee label with device type and serial number*

12.3 Warranty and service information

Information on the warranty can be found in the warranty conditions, which are included separately.

Do you have any technical questions regarding your inverter? Our customer support +49 (0)831 540 214 66 is on hand to assist.

For service information and a possible shipment of parts, we require your device type and the serial number. You will find this information on the type plate on the exterior of the housing.

If parts are required, use only genuine replacement parts.

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